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Australian Export Grains Innovation Centre

Russia

Russia's wheat industry:

Implications for Australia

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Please note

1. Export and import values often vary depending on the information source — exercise caution when interpreting information presented in this publication.
2. All units cited in this report are metric measurements. Of particular note, the unit tonnes is a metric tonne (i.e. 1000 kilograms).
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GOVERNMENT OF WESTERN AUSTRALIA
GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

AEGIC is an initiative of the Western Australian State Government and Australia's Grains Research and Development Corporation

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Contents

List of abbreviations

AEGIC	Australian Export Grains Innovation Centre
AH	Australian Hard (wheat)
ANW	Australian Noodle Wheat
APH	Australian Prime Hard (wheat)
APW	Australian Premium White (wheat)
ASW	Australian Standard White (wheat)
AUD	Australian dollar
CIGI	Canadian International Grains Institute
CIMMYT	International Maize and Wheat Improvement Center
CV	coefficient of variation
CWRS	Canadian Western Red Spring (wheat)
DNS	Dark Northern Spring (wheat)
EPR	end-point royalty
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organisation (United Nations)
FAS	Foreign Agricultural Service
FOB	free-on-board
GASC	General Authority for Supply Commodities
GCM	general circulation models
GDP	gross domestic product
GM	genetically modified
GP	General Purpose (wheat)
GRDC	Grains Research and Development Corporation
HRW	Hard Red Winter (wheat)
IMF	International Monetary Fund
km	kilometres
kt	kilotonnes
MENA	Middle East and North Africa
mmt	million metric tonnes
mt	metric tonnes
NPR	National Public Radio
ntk	net tonne kilometre
OECD	Organisation for Economic Co-operation and Development
PSE	Producer Support Estimate
RAS	Russian Academy of Sciences
RAAS	Russian Academy of Agricultural Sciences
R&D	research and development
RUB	rouble
RZhD	Joint Stock Russian Railways company
SEA	South East Asian
SSA	Sub-Saharan Africa
t	tonnes
TPP	Trans-Pacific Partnership
US	United States
USA	United States of America
USD	United States dollar
USDA	United States Department of Agriculture
WCC	Wheat Classification Council
WTO	World Trade Organisation
WW	Winter White (wheat)
YAN	yellow alkaline noodles

Foreword

In the latter half of the 20th century, Australian wheat exports mostly competed against wheat from the United States of America (USA), Canada and to a lesser extent, countries in Western Europe, such as France. These were all developed nations with roughly similar costs of production. However, over the past decade, former Soviet Union states, such as Russia, Ukraine and Kazakhstan have emerged to become important players in the global wheat market.

Collectively, these new exporters are known as the Black Sea region and they are now responsible for about 30 per cent of the global trade in wheat. Accordingly, whatever happens in that region due to climate, politics, policy or technology can alter global wheat prices. For that reason alone, it is important to understand what occurs in the Black Sea region to influence their wheat production and wheat exports.

Unlike the situation in the 20th century, Australia now faces competitors with significantly lower cost bases than its own. Moreover, in Australia, Europe and North America additional wheat production must principally come from yield growth or at the expense of an alternative crop, whereas Black Sea countries have similar opportunities plus swathes of arable land into which wheat production can expand. One of the Russian government's aspirational targets is to grow its wheat production by as much as 25 million metric tonnes over the next decade — more than Australia's annual wheat crop. Australian growers are already feeling the influence of the Black Sea region. Currently in 2016, 12.5 per cent protein milling wheat is being offered at US$160–170 per metric tonne on a free-on-board (FOB) Black Sea port basis.

To ensure the Australian wheat industry is better informed about the competitive threats it faces, the Australian Export Grains Innovation Centre (AEGIC) has examined the costliness of Australia's export wheat supply chains and then contrasted those costs against cost structures in competitor nations such as Canada, Ukraine and now, in this report, Russia. These reports provide financial comparisons and describe the key issues, strengths and weaknesses liable to affect each country's exports.

Monitoring developments in Russia will be crucially important for Australian wheat exporters. How the Russian government balances its need for food security, self-sufficiency and receipt of foreign exchange earnings via grain exports will be interesting to track over the coming decade. In this report, we examine each facet of the Russian wheat value chain, from government policy, breeding, then through the supply chain from farm to market. This information is then synthesised into a range of practical findings.

Summary of key findings

EXPORTS ARE TO INCREASE

60%

Russian grain exports are projected to increase by **60 per cent** from 2015 to 2030, with wheat exports during 2030 being 32.5mmt (up from 21.7mmt during 2015).

Russia's supply chain costs for exported wheat are approximately **AU$56 per tonne**, 32 per cent of the Russian wheat FOB price. Russia's farm costs of export wheat production are approximately **AU$121 per tonne**.

$

PER TONNE

Russia's desire for food self-sufficiency is encouraging domestic feed grain production. This requires Russian wheat breeders to **focus principally on yield** rather than grain functionality and quality.

Russia's government now sees its grains sector as an economic growth opportunity and has embarked on **organisational research and development** (R&D) reform to improve the efficiency and effectiveness of its agricultural R&D.

Productivity gains in Russian farm production and **upgrade of local grain supply chains** is continuing, underpinning the export competitiveness of Russia's grains sector.

Summary of key implications for Australia's wheat industry

- **Increased wheat exports from Russia will directly and indirectly increase the competition in Australia's key wheat export markets.**
- **Australian wheat exporters will not only face growing price competition but also will experience intensified organisational competition from North American industry organisations funded to service their Asian grain-buying customers.**
- **Australia needs organisational innovation to ensure its wheat breeding, classification systems, supply infrastructure and grain promotion activities align to deliver strategic benefits to all transactional parties, including end-users.**
- **Asia's more-rapidly-growing markets are likely to continue to accept Australian and Russian wheat, even though Australia's market share in some of these markets is likely to be diluted.**
- **The growing importance of Russia and its Black Sea neighbours in international grain production and grain trade makes it necessary for Australia to constantly monitor developments in that region.**

OR

Short survey — all responses are anonymous

Tell us how important you think these implications are for Australia.

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Executive summary

Geography

- Russia's grains industry enjoys some significant competitive strengths. It possesses two-and-a-half times more arable land than Australia and, unlike Australia, has significant reserves of fertile land in some regions on which to expand cropping. However, the economic viability of introducing cropping onto this fertile long-fallowed land differs from region to region, limiting the potential upside of future production increases.
- Russia's Black Sea access and close proximity to the growing Middle East and North Africa (MENA) region provides a ready source of demand that can absorb a large proportion of Russia's growing exportable surplus. While Russia enjoys a clear freight advantage over Australia into the MENA market, as Australia does likewise into Indonesia, the historically low ocean freight rate subdues Australia's freight advantages into South East Asia.
- Russia's grain production is mostly concentrated in its southern regions, providing easy access to its large Black Sea ports. This ensures Russia's supply chain costs are far less than those in Canada, or in many parts of Australia.
- Russia's sole far eastern port (Vladivostok) is located within easy reach of North Asian markets, such as Japan and South Korea. However, with production concentrated around the Black Sea, Russia's eastern seaboard has negligible prospects as a grain export point due to the immense distances over which grain would need to move.
- There are opportunities for Russia to create railway linkages into China and South East Asia through Kazakhstan, though these shorter supply chains are not yet operational and it is unlikely a significant volume of grain will be transported along these routes within the next five or so years.

Food security, self-sufficiency and food affordability

- Political imperatives, uneven wealth distribution and a history of intermittent, yet devastating, droughts make food security, self-sufficiency and food affordability key concerns in Russia. Grain plays a critical role in feeding Russia's population — both directly (via flour-based products, such as bread) and indirectly (via animal protein, which needs a ready source of affordable feed grains).
- The policies and actions of the Russian government during the past decade or so demonstrate a clear focus on improving food security, self-sufficiency and food affordability. However, the economic downturn since late 2014, caused by falling energy prices and western sanctions over Russia's annexation of Crimea, has seen a small, but important, re-weighting of these priorities as the government also looks to agriculture as a future source of economic prosperity.
- Russia's desire for food security has important implications for Australia's grain export industry. The Russian government has demonstrated its willingness to implement sudden export bans that can dramatically change global wheat prices. However, such bans are less likely to occur as Russia's grain production increases and food security and self-sufficiency objectives are more easily met. There are growing questions within Russia as to the effectiveness of export bans as a food security lever. This, combined with a growing production base, should see the likelihood of further export bans somewhat diminished.
- Increased grain production and exports from Russia are likely to lead to increased competition in Australia's key grain markets and ultimately, lower farm-gate prices for grain and a reduced incidence of Russian policy-induced price spikes.
- Russia's burgeoning grain production is expected to continue growing, albeit at a slower rate, mostly due to a greater intensity of crop production. With its population now stabilising, after declining by five million people during the past 15 years, the growth in grain production should lessen the impact of drought on food security.
- A key part of self-sufficiency in Russia is to boost livestock production and thereby avoid any repeat of the 1990s when livestock numbers collapsed. Hence, feed grain production is being encouraged. This requires crop breeders to focus on yield rather than grain functionality and quality. Russia's recent bans on the import of livestock products from either the European Union (EU) or other western nations is also supporting livestock production in Russia and stimulating demand for feed grain in Russia.

Farm inputs

- Russia has a large rural population that provides grain-farming operations with abundant low-cost labour. Compared with other grain-exporting nations, like Canada, the USA, EU and Australia, the cost of labour in Russia is significantly lower.
- Key inputs, such as fuel, fertilisers and machinery, are available from local sources, however limited access to affordable sources of credit often restricts the use of some of these crucial inputs. Nonetheless, since 2000 fertiliser application rates on Russian grain crops have doubled.
- The marked devaluation of the rouble (RUB) since late 2014 and the subsequent unleashing of price inflation also have complicated purchasing decisions regarding farm inputs.

Export projections

- Since the early 2000s, Russia has become one of the world's top-ranked exporters of wheat, barley and sunflower oil.
- Russian grain exports are projected to increase by 60 per cent from 2015–30.
- The composition of grain exports by 2030 is forecast to be 32.5mmt for wheat (up from 21.7mmt in 2015), 9.7mmt for corn (up from 3.6mmt in 2015), 5.6mmt for barley (up from 4.7mmt in 2015), and 0.5mmt of other grains.
- Most of the increase in grain production is projected to stem from greater intensification rather than expanding grain production into marginal areas.

Grain supply chains

- Most of Russia's exported grain is grown in its southern regions, where the economics of freight favour road transport. The road freight network is more flexible and less expensive than rail.
- With a mix of both shallow and deep-water ports located on its Black Sea coast, Russia has an effective corridor for shipping grain to MENA countries, such as Egypt. Russia's panamax-capable, deep-water ports, while fewer in number, have been upgraded, drawing on foreign and Russian investment. These upgrades have boosted exporters' abilities to efficiently move large volumes of grain through the supply chain, landing cargoes in export markets with fewer rate-limiting steps, such as draft restrictions.
- However, many other parts of Russia's grain supply chain remain in dire need of upgrade and repair. In particular, there has been underinvestment in rail infrastructure and on-farm storage, most of which was constructed during the 1950s to 1970s. For railways, an overhaul of their ownership structure may be needed to ensure required investment and improvement occurs.
- East from the Black Sea, the only other major export port is Vladivostok, which appears, at least geographically speaking, to provide Russia with an ideal beachhead in north Asia. However, being located some 7000km from the country's grain production epicentre, Vladivostok is unlikely to play a substantial role in Russia's push into Asia unless the cost of grain production, rail freight costs or grain prices change dramatically.

Supply chain costs

- Russia's predominantly yield-driven growth in both production and exports will stimulate further investment in supply chain infrastructure, including local and foreign investment, attracted by accessing trade volumes and securing economies of scale benefits that lower the unit cost of rail and port infrastructure services. A greater proportion of grain will be moved by rail in coming years.
- Supply chain costs for moving grain to port from Russia's main wheat export regions typically form 32 per cent of wheat FOB prices.
- As at mid-2016, Russia's supply chain costs for wheat are estimated to be ~AU$56/t, with pre-farmgate production costs of ~AU$121/t. This gives Russia, along with its similarly competitive Black Sea neighbours, a powerful competitive advantage against Australia and North America when targeting price-driven markets.

Politics and corruption

- Political decisions can greatly affect many aspects of Russia's economic and social life; and grain production and export are not immune. A tax on wheat exports was introduced during 2008 and again in 2015 and a ban on exports of wheat was imposed in 2010 following a poor harvest. These decisions reveal not only the power of the Russian government, but also the crucial importance of self-sufficiency and food affordability in Russia. It means grain exports from Russia are not simply the product of climate, but also can be the outcome of deliberate government action.
- The World Economic Forum's 2015/16 rankings show corruption, taxation, access to finance, inefficient bureaucracy and inflation are the most problematic issues affecting the ease of doing business in Russia; with corruption being by far the main concern.

Productivity and R&D

- Despite its sizeable area of cereals (40 million hectares), Russia's wheat yields are typically less than 2t/ha, although trending upward at a *greater* rate than occurs in Australia. This yield growth is principally attributable to greater adoption of modern technologies. While Russian wheat yields are low compared with yields in other major wheat-exporting countries, apart from Australia, Russia has the potential to substantially improve its yields.
- Productivity gains have allowed Russia, since the early 2000s, to become one of the world's top-ranked exporters of wheat, barley and sunflower oil. This considerable growth of trade has been supported by increased rates of fertiliser application, increasing yields and an expanding

area (except for barley), along with the currency depreciation since late 2014.

- The collapse in energy prices has turned the Russian government's attention to agriculture as a key element of a more diversified economy. In addition, regional geopolitics has intensified the focus on food security and self-sufficiency.
- Economic and political turbulence since the collapse of oil prices during late 2014 is affecting grains R&D in Russia. The Russian government now sees the grains sector as an economic growth opportunity, although it is fiscally constrained in how it can support grains R&D and supply chain infrastructure investment. The government has embarked on organisational R&D reform to improve the efficiency and effectiveness of its agricultural R&D.
- Russian leadership has already started reforming the institutions of agricultural R&D, with a focus on ensuring any beneficial research translates into economic benefits. If successful, this reform should ultimately lead to further technology-driven yield and productivity gains. However, compared with other major grain exporting nations, Russia's quality and magnitude of its grains R&D currently is low.
- Compared with Australia and North America, grains R&D in Russia will continue to focus its efforts on higher yields rather than particular grain functionality. Given the relatively poor functional characteristics of the grain, Russia's production growth will need to be absorbed by export markets in Asia, along with traditional markets in the MENA region. Currently, the lower end of the global market can absorb any exportable surplus produced by Russia. However, eventually Russia is likely to look to more differentiated market segments, which will require additional breeding focus on grain quality and functionality.
- In Russia there are weak linkages between research and extension services, resulting in slower adoption of productivity-increasing technologies.

Wheat customers

- There is only minimal overlap among Australia and Russia's top-20 wheat customers, which have historically been the product of geography and ocean freight costs. However, Russia is gradually exporting more wheat into Australia's key South East Asian (SEA) markets. Russia has identified Morocco, Indonesia, Philippines, South Korea, China and Algeria as important sources of future demand. Aside from Morocco, all of these markets would be considered as key Australian markets of ongoing or future importance. At the lower end of the market, Russian wheat has been slowly gaining acceptance as filler wheat in South East Asia.
- In South East Asia, Russia has captured a portion of the price-conscious end of the market where, along with Indian wheat, it is used to bring down the cost of grists.
- While Russian wheat typically lacks the extensibility needed for high-quality noodles, its baking properties range from Australian Standard White wheat (ASW)-equivalent to even Australian Hard wheat (AH)-equivalent. That said, this is only relevant if Russian wheat makes inroads into the top half of the market, as it currently occupies a segment with few functional requirements.
- Russia has gradually been earning its reputation as a supplier of cheap, functionally-acceptable wheat. However, the Russian government's wheat export bans during the past decade have tarnished Russia's reputation as a stable supplier in export markets. While price buyers have short memories, the risk of supply disruption will make some buyers in South East Asia wary of basing too much of their overall program around Russian wheat. At the other end of the spectrum is Egypt, whose need for large volumes of cheap, imported wheat affords them little alternative but to mostly leave their fate to Russian policy makers.
- Going forward, there has been a growing realisation among Russian policy makers that the temporary restrictions on wheat exports have been too blunt an instrument, with debatable benefits. This may see the Russian government look to alternative policy measures to control domestic food inflation, which will, in turn gradually give millers in MENA and South East Asia more comfort in purchasing Russian wheat.
- There has been significant modernisation of Russia's grain supply chain, allowing greater scope for targeting specific niches in Australian wheat export markets, or markets with more stringent demands around functionality or parcel sizes. This is further amplified by a growing understanding of its milling properties, enabling millers to push up the inclusion rates of Russian wheat. This trend appears set to continue over the next five years at least. However, this process of acceptance may not be uniform. Certain markets (such as Indonesia) are likely to increase their purchases of Russian wheat, whereas other markets (such as Japan or South Korea) are less likely to buy Russian wheat for milling in the short to medium term.
- Freight differentials, along with undemanding quality requirements, are such that Russia enjoys a powerful competitive advantage in the MENA region. There is little evidence buyers in MENA can monetise the superior quality of Australian wheat to the degree that can justify its price premium. However, with its need for extensible wheat and balanced dough properties, the SEA market can support a finite premium for Australian wheat. However, this advantage is losing traction, resulting in Australian wheat being priced out of this market from time to time.

- While the Asian baked goods sector is expected to grow along Westernisation lines, bread is not considered a staple in Asia, with the traditional rice and noodle-centric diets still dominating. Due in part to the agronomic unsuitability of wheat in much of Asia[1], many of Australia's key markets have pressing food security concerns. This will only intensify as populations grow and diets continue to Westernise towards greater meat consumption based on grain-fed animal production.
- As an end product, noodles are less forgiving of quality shortcomings than traditional MENA staples, such as flat breads. In addition, the extensibility of Australian wheat offers a barrier to entry that protects its market share to some degree — although this barrier is not substantial.
- With the rising tide of Russian and Ukrainian wheat flowing in the direction of Australia's export markets, differentiation can act as a defensive and offensive investment. Wheat breeding in Australia, with its long lead times and path-dependency effects, can develop wheat types attractive to end-users and Australian wheat-growers. Other activities, such as classification changes, new segregations, more efficient supply chains and industry-good marketing functions, however, are essential competitive complements. To deliver these integral changes requires organisational innovation and structural change.
- Compared with SEA demand, the occasionally large volume of Australian wheat historically imported by MENA countries will remain at risk of being crowded out by Russian and Ukrainian exports. Many MENA markets are growing more slowly than Asian markets and so price-preferred Black Sea wheat can rapidly displace Australian wheat in those markets. Conversely, the more rapidly-growing Asian markets can continue to accept Australian *and* Black Sea wheat, even though Australia's market share in some of those Asian markets is likely to be gradually diluted.
- As Russian wheat exports make inroads into Australia's SEA markets, Australian wheat exporters will not only face growing price competition but will also experience organisational competition. The Canadian International Grains Institute (CIGI), France's Export Céréales and the US Wheat Associates will be increasingly active in servicing growing Asian demand for wheat. These organisations will help ensure their countries' wheat continues to receive premiums and market share in that region. Australia has no co-ordinated response to address this organisational competition.
- Australia needs organisational innovation to help combat the organisational competition it will increasingly face in Asian and other markets. This innovation must ensure Australia's wheat breeding, classification systems, supply infrastructure and grain promotion activities align to deliver strategic benefits to all transactional parties, including end-users.
- Australia is well placed, by its geographical proximity, out-going culture and trade imperatives, to serve its grain customers in nearby Asian markets, such as Indonesia.

Wheat production

- Russia and its Black Sea neighbours form the most important wheat-exporting region in the globe, being responsible for about 30 per cent of global wheat exports. Hence, any changes in wheat production in the Black Sea region, due to climate, technology, politics or policy, have the capacity to greatly influence the international wheat trade, thereby directly or indirectly affecting Australian wheat exports. Accordingly, it is essential Australia monitors and reports developments in the Black Sea region.

Wheat quality

- The area of winter wheat in Russia is increasing and has now outstripped the area sown to spring wheat. Typically, winter wheat is higher yielding than spring wheat, which usually has higher protein and is more suited to baking.
- Russia's production of spring and winter wheat causes a range of wheat qualities to be available in Russia. Better breeding, greater use of modern crop technologies and investment in improved grain storage should lead to improvements in the quality of Russian wheat.

Wheat pricing

- The collapse of oil prices during late 2014, plus Russia's decision in that year to move to a floating exchange rate, have led to the RUB depreciating by about 50–60 per cent against the USD and the Euro. Hence, Russia's grain price competitiveness is mostly underpinned by this large movement in its exchange rate. Further changes in economic circumstances will affect the RUB:USD exchange rate and thereby affect the international competitiveness of Russian wheat on global markets. However, no large appreciation is currently forecast.
- Russia and its Black Sea neighbours now supply about 30 per cent of the global wheat trade and have low costs of wheat production. Also, grain harvest in the Black Sea usually starts before any of the other major exporters. Hence, the region has become a price-setter on international wheat markets.

1 Excluding China and small pockets of production in countries such as Japan.

Dynamic Crop Sequence trial at Katanning, Western Australia.
Source: DAFWA

Summary of Australia's required actions

The emergence of large, low-cost wheat producers such as Russia has changed the competitive landscape for Australian wheat exports. Failure to adapt to this situation may worsen the viability of wheat production in Australia.

Therefore, we recommend the following required actions for Australia, several being similar to actions recommended in our previous report on Ukraine.

1. **Keep committing to Research & Development for farm-level innovation that drives down the unit cost of wheat production.**
   Some fiscally imperilled governments in Australia have lessened their commitment to agricultural R&D. Insights and innovation from R&D are essential to maintain the export competitiveness of Australian grain.
2. **Quicken the pace at which supply chain infrastructure is upgraded and rationalised, to drive down supply chain costs.**
   Supply chain costs are about 30% of the total cost of production for Australian growers. Key organisations must compete yet also collaborate to deliver cost efficient services.
3. **Monitor and report the strategic importance of changes in the Black Sea region that affect grain markets.**
   Black Sea grain production will form a larger share of the international wheat trade, so this region increasingly will affect grain markets. Being forewarned of Black Sea strategic changes provides the Australian industry with time to respond appropriately.
4. **Sustainably fund and coordinate intelligence about the requirements end users have for Australian wheat so we can provide a product they value more.**
   Industry will and leadership — and a degree of inventiveness — is required to ensure these activities occur. If we know what our customers want and value, we can better serve their needs. Australia's North American competitors are already better at funding and coordinating their servicing of Asian customers.
5. **Don't panic: ensure our actions are well-considered, coordinated and strategic.**
   Australia faces a tide of Black Sea grain, not an immediate tidal wave. Australia has time to respond and so should not panic. However, a status quo response will not best serve Australia's wheat industry. Moreover, most Australian grain growers, unlike many Black Sea grain growers, need not be forced or panicked into selling their grain. Australian farmers benefit from effective grain storage, complemented by a range of price risk management options, so they can be more strategic about selling their grain.

OR

Short survey — all responses are anonymous

Rank the importance of these actions for Australia and add your own.

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Introduction

This report, which forms part of AEGIC's *Black Sea Series*, provides a comprehensive overview of Russia's rapidly-changing grain production, logistics and export pathways, with a focus on the implications for the Australian grains industry. This report complements our previous report on Ukraine and aims to provide description and analysis that informs and guides a strategic response by the Australian grains industry.

After a calamitous transition from a centrally-planned Soviet economy, to what was ostensibly a 'free market' economy in 1991, Russia has gradually emerged, especially during more recent years, to become an important exporter of wheat; Russia's main grain. Exchange rate movements, the gradual modernisation of agronomic practices and greater investment in farm machinery and logistics infrastructure have facilitated this achievement.

Although wheat dominates grain production in both Russia and Australia, the production of other crops in Russia, such as corn, oilseeds and barley, is also relevant to Australia through the flow-on impacts on wheat prices of the grains' complex. Therefore, while wheat remains the prime focus of this report, and the previously released Ukraine report, mention is made, where warranted, of relevant changes in production of other crops.

The reader may (or not) be pleased to note that in light-hearted moments, we toyed with titling this report: A Tolstoy-ry about Russian wheat? (Is it worth disPutin?). However, conservatism prevailed and we settled on the formal and less controversial title: *Russia's wheat industry: implications for Australia*.

This report, which forms part of AEGIC's *Black Sea Series* ... complements our previous report on Ukraine.

Country snapshot

Russia is the principal country in the triumvirate of grain producers who are collectively referred to as 'The Black Sea region': Russia, Ukraine and Kazakhstan. The Black Sea region, however, is not a unified, homogeneous region of grain production.

Each Black Sea country has different dynamics shaping the evolution of their grain production landscape. In addition, each country has differences in their climate and geography, which affect grain production. Hence, AEGIC has prepared separate reports on Ukraine and Russia. Kazakhstan is included in a combined report released by AEGIC in late 2016.

Russia dwarfs its neighbours in economic, military and geographical terms (see Table 1). Although agriculture is an important sector and source of employment in all three countries, it plays a far less important economic role in Russia, accounting for only five per cent of GDP and seven per cent of the nation's workforce. Only 13 per cent of its territory is devoted to agriculture, and only seven per cent is arable land. In Russia and Kazakhstan fuel is by far the dominant export whereas Ukraine relies heavily on agricultural exports.

Despite Russia's vast land area, its production of cereals, the country's dominant crop, is only around 60 per cent greater than cereal production in Ukraine. In addition, Russia's cereal yields, like those in Kazakhstan, are relatively low by global comparison to cereal yields in the EU, the USA or Canada.

Russia's economy is more diversified than that of Ukraine or Kazakhstan, and its standard of living is also higher, with Russian per capita gross domestic product (GDP) being around US$11,000 in 2015 compared with US$2824 and US$10,547 in Ukraine and Kazakhstan, respectively. Moreover, Russia's population is three times that of Ukraine and eight-fold greater than the population of Kazakhstan.

Despite Russia's economic might, it has endured, like its former Soviet territories, Ukraine and Kazakhstan, similar economic vicissitudes. All these countries have only gradually emerged from the economically-chaotic dissolution of the Soviet Union. The description of these economies as 'transition market economies' is apt as their transformation and adjustment has been neither smooth nor rapid.

Like Kazakhstan, Russia is blessed with abundant energy reserves, which have underpinned its economic prosperity, especially during the 2000s. Russia's strong reliance on energy exports (Figure 1), during recent years, however, has exposed its economy to adverse movements in global oil prices. The pronounced downward trend in oil prices (Figure 2) since June 2014 has greatly affected the value of the Russian currency (rouble — RUB) and sparked economic turbulence not only in Russia but also in other countries that rely heavily on oil exports. During 2014, Russia's export revenues were US$555 billion, with almost two-thirds of that revenue coming from her energy sector.

The marked decline in international oil prices placed further pressure on the Russian currency, which during 2014 moved to a free-floating exchange rate. During late 2014 and throughout 2015 the rouble rapidly depreciated (Figure 3), losing 60 per cent in value against the USD and the Euro. During early 2016 the rouble reached a record low against the USD after which it staged a recovery as oil prices have improved.

Table 1 Economic indicators for Russia, Ukraine and Kazakhstan in 2015

	Russia	Ukraine	Kazakhstan
Population (million)	142	46	17
Birth rate (per 1000 persons)	13	11	23
GDP per capita (constant 2010 USD)	11,039	2824	10,547
Inflation, consumer prices (%)	16	49	7
Exports (% of GDP)	30	53	29
Food exports (% of exports)	5	31	3
Fuel exports (% of exports)	63	3	77
Agriculture, value-added (% of GDP)	4.6	14	5
Rural population (% of total population)	26	30	47
Agricultural employment (as % of total employment)	7	15	24
Land area (thousand km^2)	16,376	579	2700
Ease of doing business (1=most friendly regulations, 100=least)	51	83	41
Agricultural area (as % of land area)	13	71	77
Cost to export (USD per container)	2401	1880	5285
Arable land (as % of land area)	7	56	9
Cereal production (mmt)	103	63	17
Cereal yield (t/ha)	2.4	4.4	1.2

Source: World Bank database, 2016

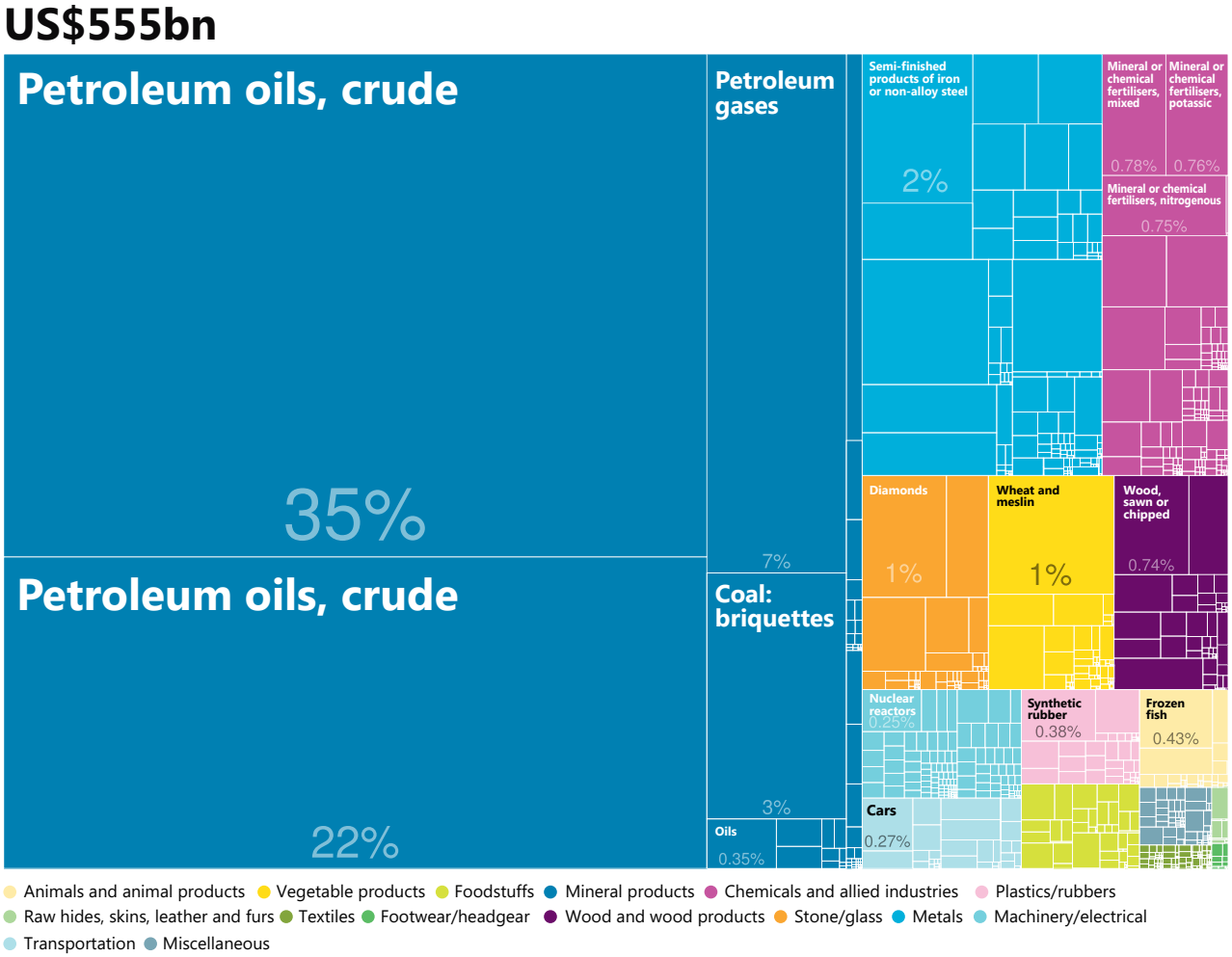


Figure 1 The product composition of Russia's export revenues in 2014

Source: *The Atlas of Economic Complexity*, Center for International Development at Harvard University, www.atlas.cid.harvard.edu

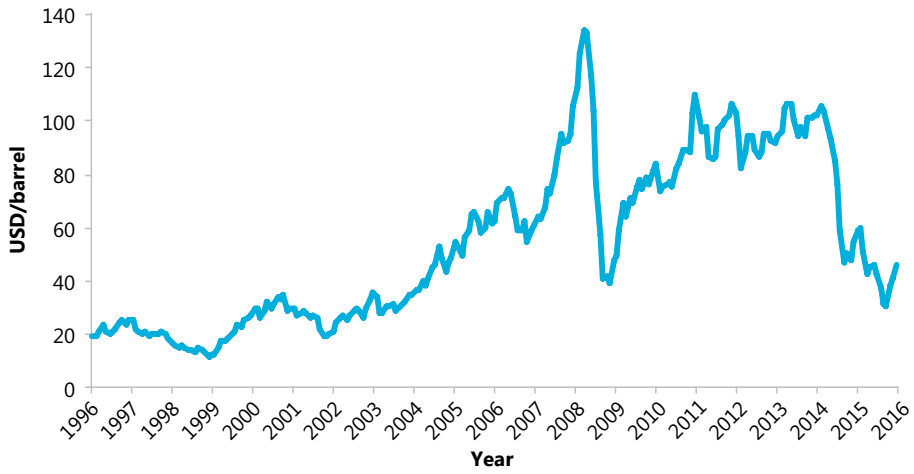


Figure 2 Monthly oil price (1996–2016)

Source: US Energy Information Administration

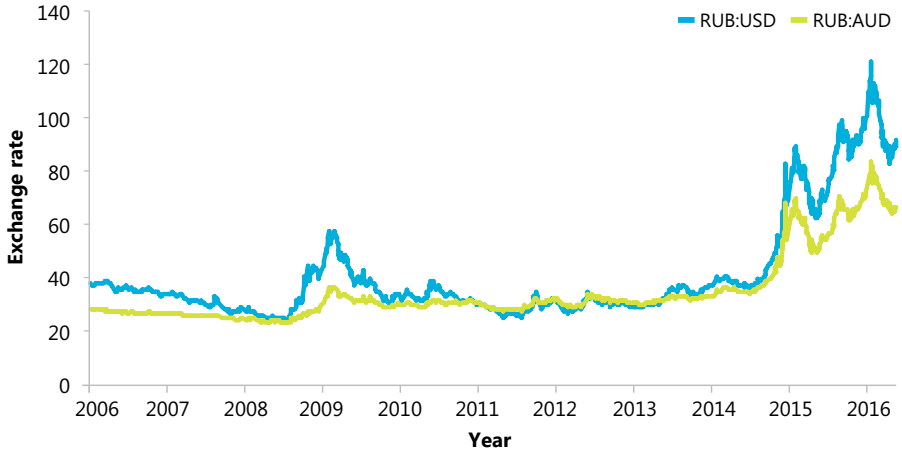


Figure 3 Monthly exchange rates (RUB:USD and RUB:AUD) since June 2006

Source: IMF (2016)

Associated with the decline in international oil prices has also been a decline in the real prices of major crops (shaded region in Figure 4) since 2012, putting further pressure on the Russian currency, which during 2014 moved to a floating exchange rate. Since 2014, the rouble has depreciated by about 50–60 per cent against the USD and the Euro, and during early 2016 reached a record low against the USD and the AUD.

For Russia's grains sector, the heavily devalued rouble has boosted its export price competitiveness, as grains are principally traded in USD. However, as we have seen recently in Ukraine, this competitiveness is dampened somewhat by the increased cost of any imported inputs, such as specialised machinery.

During 2014, with the price of oil peaking at around US$100/barrel, energy accounted for around half of the government's total tax receipts, so the lasting plunge in oil prices near the end of 2014 has seriously exposed the Russian government's reliance on just one sector to prop up its budget. This, along with the devaluation of the rouble, has led to per capita GDP plummeting from the post-Soviet peak of just above US$15,300 in 2014, to around US$11000 in 2015. This situation is not expected to ameliorate any time soon, with Russia's GDP, in local currency terms, shrinking by 3.7 per cent, while inflation topped 15 per cent. In the short term Russia's GDP is projected to decline by an additional one per cent during 2016 (IMF, 2016). Regarding wheat, Russia's principal export crop, downwards pressure on international wheat prices seems destined to continue with carryover stocks of wheat continuing to rise from 188mmt, 200mmt, 215mmt to a projected 218mmt in 2013/14, 2014/15, 2015/16 and 2016/17 respectively (IGC, 2016).

This bearish picture for oil and grains, along with Western sanctions linked to the annexation of Crimea, as well as high government expenditure on the military and social services, are creating economic difficulties for Russia. Real wages fell by four per cent during 2014 and nine per cent during 2015, with further falls forecast for 2016. Wage arrears are up and more

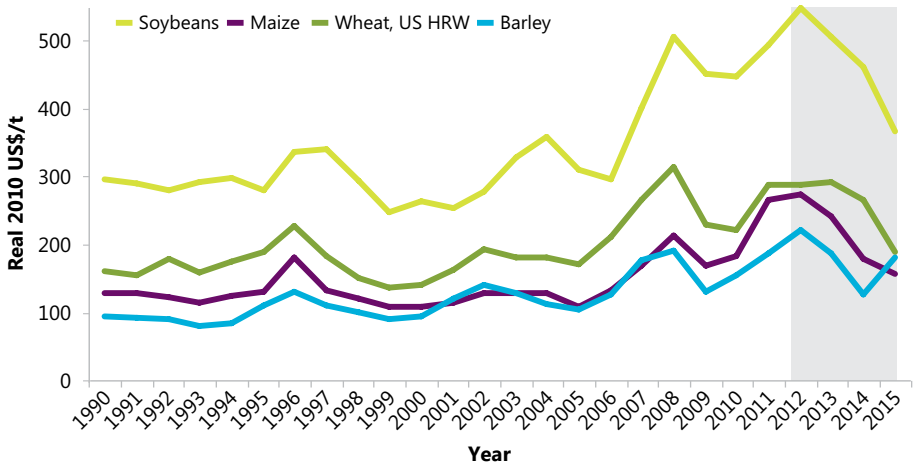


Figure 4 Real prices of major grains (1990–2015)

Source: WorldBank

than two million people fell into poverty during 2015, and the share of families who cannot afford even basic food or clothing rose from 22 to 39 per cent. Pensions, which are normally indexed to inflation, will rise by just four per cent during 2016, despite inflation running at 15 per cent. Retail sales and foreign travel, which are typically accurate indicators of disposable household surpluses, have dropped precipitously. During February 2016, for the first time in eight years, consumer expenditure on food, alcohol and tobacco formed more than half of retail turnover, indicating the extent of decline in real incomes and consumers' need to concentrate on buying 'essentials'. Foreign investment and the availability of foreign-sourced credit, two key factors in Australia's recent resources boom, are drying up. This dampening of investment-driven economic activity is leading to reduced confidence in the rouble as a store of value, which in turn has led to capital flight from Russia (US$150bn of net outflow during 2015). Since late 2014 Russia's government reserve assets (e.g. gold reserves, special drawing rights, foreign exchange assets) have dwindled substantially in response to a range of financial and economic pressures unleashed by the downturn in energy prices.

At the time of writing in 2016, a conceivable circuit breaker will be the next major up-tick in global economic activity, which should stimulate the Russian economy, both directly and also via higher oil prices, which tend to move in tandem with economic growth. However, according to some forecasters, the oil price is likely to remain stubbornly low until at least the end of 2018. The Bank of Finland has estimated this would mean Russia's economy is likely to shrink a further three per cent during 2016, with economic growth not returning until 2018.

These gloomy economic conditions have implications for Australia's grain growers and the wider grains industry. While a depressed rouble keeps Russian grain competitive in USD terms, a dearth of economic activity puts pressure on government coffers, constraining the Russian government's ability to invest in productivity-enhancing research, innovation and logistics infrastructure needed to support a growing export grains sector.

However, this limited ability to invest does not mean the Russian government will resign itself to a minor role in developing and overseeing the country's grains sector. This is particularly the case where the population's ability to feed itself is involved. For example, during 2015 the Russian government introduced a new tax on grain exports. The export duty was set at 15 per cent of the custom's price, plus 7.5€/t. This was the third time since 2008 the Russian government has imposed restrictions on grain exports. These taxes increased the supply of grain onto domestic markets to support livestock industries. Increasing this feed supply helped boost domestic animal production and thereby improved Russia's self-sufficiency in food production. Greater provision of local food products also helped place downward pressure on domestic food price inflation.

The political environment

Russia forcibly annexed the Crimea in Ukraine during 2014 and the south-eastern parts of Ukraine remain an unsafe conflict zone. In response to Russia's actions, Western nation sanctions have been imposed on Russia since the summer of 2014 and Russia, in return, has engaged in trade retaliation. For example, on 7 August 2014, Russia introduced an import ban on a range of agricultural products originating from the USA, the EU, Canada, Australia and Norway. Beef, pork and poultry meat, dairy products, fruits and vegetables were the targeted categories. On 25 July 2015, Russia announced the extension of this import embargo until August 2016. In addition, the ban has been extended to another four countries: Iceland, Liechtenstein, Albania and Montenegro.

Of Russia's US$39bn worth of agri-food imports during 2013, US$23.5bn were in the product categories affected by this ban (FAO, 2014). The import ban has fuelled food and general inflation and reduced food availability (Liefert and Liefert, 2015c), as shown in the rapid rise in inflation since 2014 (Figure 5).

An anecdote of inflation comes from Yuval Weber, assistant professor at Moscow's Faculty of World Economy and International Affairs at the National Research University Higher School of Economics:

> *"I will say that my personal inflation index is to observe the price of shawarmas [street kebabs] in Moscow. When I first moved here in 2012, 80 rubles (sic) was pretty standard. Now 120 [in 2015] doesn't deter people. This is the real Big Mac index of Moscow."*

Source: http://readrussia.com/2015/06/17/whos-left-in-russia/

Another example of the interface between Russian geopolitics and agriculture is the ramification of a Turkish fighter plane shooting down a Russian warplane during November 2015. President Putin reacted by signing a decree, which included a ban on some Turkish agricultural imports and a ban on hiring Turkish nationals. Vegetable and fruit imports from Turkey were banned from 1 January 2016.

Usually Russia imports about US$750m of Turkish fruits and vegetables annually, while Turkey imports more than US$1.1bn of Russian wheat; although during the first half of 2015/16 Turkey had reduced its imports of Russian wheat by 36 per cent, importing only 2.1mmt of wheat, down from 3.28mmt during the same period of the previous year. Wheat of sufficient quality from Kazakhstan and Ukraine was available at attractive prices.

All these recent geopolitical changes now mean the USA, Ukraine and Turkey are perceived as Russia's principal enemies, while Belarus, Kazakhstan and China are perceived as its best friends (Levada Center, 2016a). Prior to the end of 2015, Turkey barely received a mention by most Russians as being a perceived enemy. Yet during 2016, Turkey had jumped into third position as a perceived enemy of Russia.

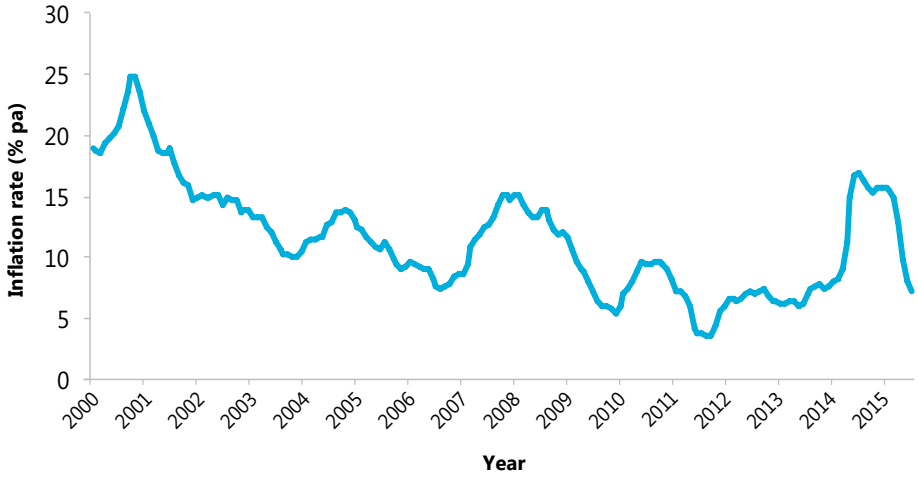


Figure 5 Monthly inflation in Russia since 2000
Source: OECD data

In general, the Russian government has demonstrated a preparedness to exercise its powers in many ways that affect its economy, including Russian grain production and grain exports. Often the interests of any region or sector, including the grains industry, are subservient to the emphasis the Russian government places on geopolitics and food security. At various times, market forces alone are not the main determinant of change in Russia. Rather it is the policy decisions of the Russian government that can leave short term and longer imprints on regional growth and the profitability of various sectors, including the grains sector.

Corruption

Aside from problematic global macroeconomic conditions, Russia and its Black Sea neighbours also suffer from a weak rule of law and prevalence of corruption that affect economic activity in each country. For example, a Russian public opinion poll undertaken in 2016 (Levada Center, 2016b) indicated that most respondents (86 per cent) considered almost all politicians, or at least a number of them are engaged in corruption. Regarding government officials, 62 per cent of respondents believed that most top government officials are involved in corruption and a further 25 per cent believed only a few of those officials are involved in corruption. In the same survey only 25 per cent of respondents thought President Putin would succeed in lessening corruption.

World Bank surveys indicate that during 2009 Russian managers spent 20 per cent of their time dealing with government regulations — more than twice as much as their peers in the 10 emerging countries of the EU. Furthermore, the World Economic Forum's 2015/16 rankings (Figure 6) show corruption, taxation, access to finance, inefficient bureaucracy and inflation are the most problematic issues affecting the ease of doing business in Russia. By contrast, corruption and inflation are almost absent from the list of problems affecting doing business in Australia. However, the issues of taxation and inefficient bureaucracy are similar key problems in Australia.

R&D investment

While Russian researcher salaries are higher than those for the general Russian commercial and manufacturing sectors, they are just a fraction of those offered for similar positions in the USA, Germany, South Korea and other Western countries. As a result of this, and due to the economic deterioration in Russia, according to a recent report on National Public Radio (NPR), up to a quarter of Russia's well-educated young people have stated they are considering emigrating to more attractive countries (Source: www.rdmag.com/articles/2012/12/bric-russia).

Not only are researcher salaries relatively unattractive, but R&D investment in Russia is also comparatively and consistently low when compared with expenditures in some other major Organisation for Economic Cooperation and Development (OECD) countries (Figure 7). Additionally, existing research equipment, machinery, and facilities have not been upgraded. Russian military-based R&D spending, considered at one time to be nearly equal to that of the USA, has been reduced from 38 per cent of the total R&D budget in 2005 to just 18 per cent in 2012, according to a recent report by RIA Novosti, the Russian International News Agency.

About 75 per cent of all R&D funding goes to public-sector institutions, such as universities, academies of science and industry-specific R&D organisations. Historically academies have been the leading research organisations, but limited and changeable funding, combined with organisational failings, have led to deterioration in the quality of their research. The government has introduced policy changes aimed at encouraging more research in universities through the creation of 'research university' status, which provides additional

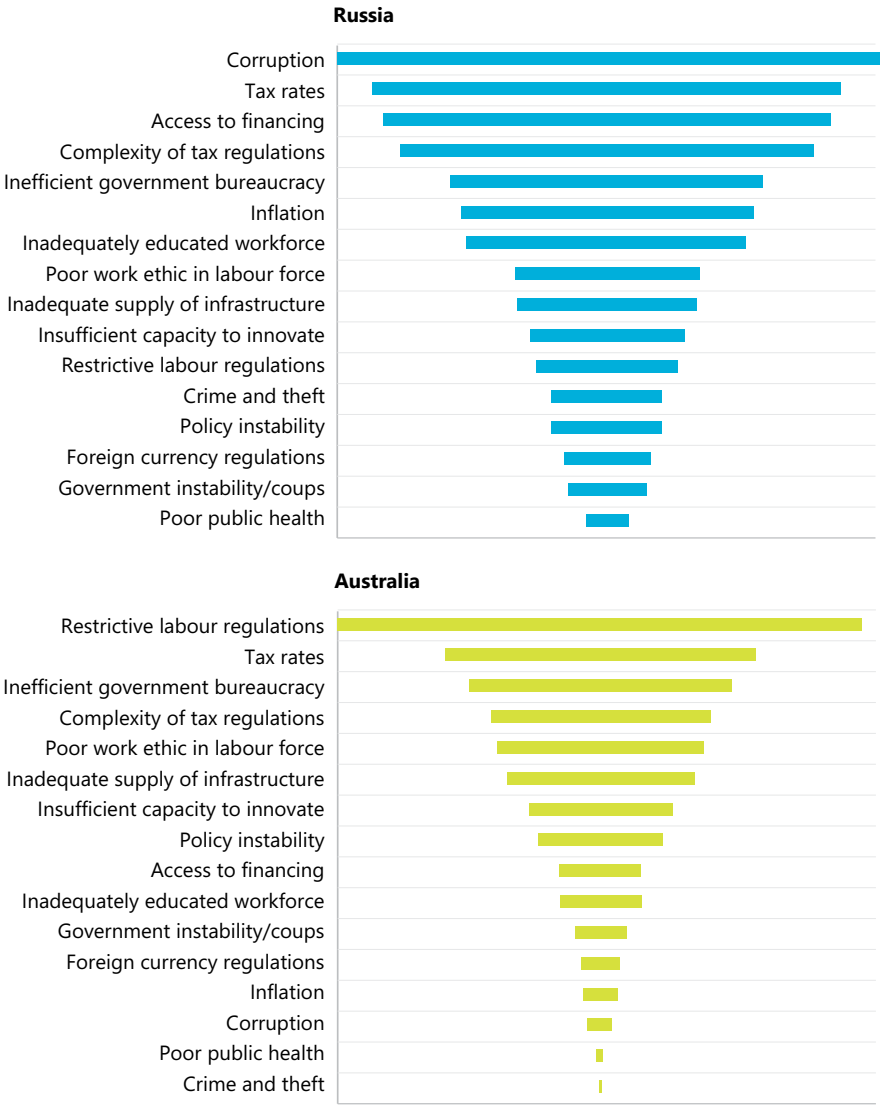


Figure 6 The most problematic factors for doing business in Russia and Australia

Source: Based on data in Schwab (2015)

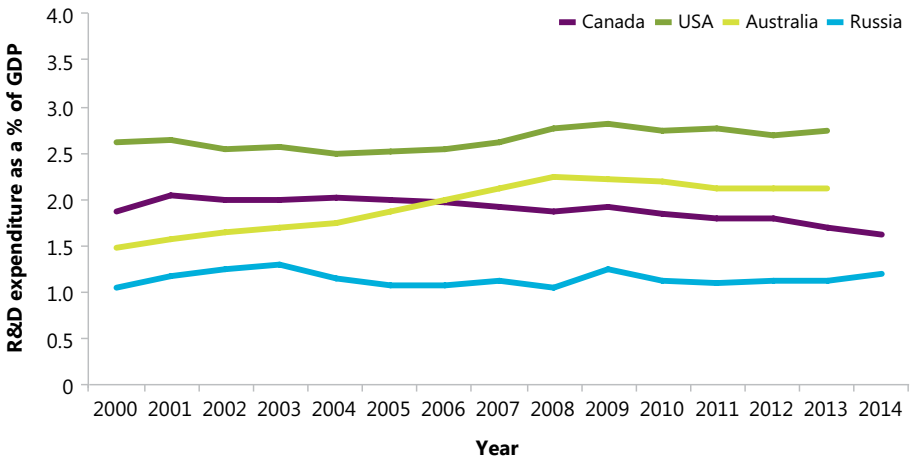


Figure 7 R&D expenditure as a percentage of GDP in some key wheat-exporting nations (2000–14)

Source: OECD See: https://data.oecd.org/russian-federation.htm

funding. The academies have been subject to amalgamations during recent years to improve their efficacy. It is acknowledged the emphasis on public funding and public R&D institutions unfortunately means there tends to be weak links between the R&D spending and the business application of that research. Inadequate investment in extension and communication activity causes much research to be poorly applied. Low salaries and an eroded prestige in the agricultural sciences cause low inflows of young scientists into agricultural R&D. Moreover, R&D conducted by foreign businesses in Russia accounts for a miniscule share of expenditure on R&D, despite attempts to attract foreign investors by setting up special economic zones for technology. Research activity in Russia is highly centralised with 60 per cent of Russia's researchers working in Moscow, the Moscow region and St Petersburg.

Only 2.4 per cent of Russian R&D expenditure is for agriculture (Gokhberg and Kuznetsova, 2015). Moreover, of the 5.6m students enrolled in in Russia's tertiary institutions during 2013/14 only 2.8 per cent were studying natural sciences, physics or mathematics. Engineering attracted 20 per cent, economics and management 31 per cent and the humanities 20 per cent. Hence, the pool of students focusing on agriculture and the natural sciences who are likely to become the next generation of agricultural researchers is relatively small.

A concerning development for Russian researchers has been the May 2015 decree of President Putin that requires all academics in Russia to now submit their papers for review by the Federal Security Service before attending conferences or publishing those papers (Schiermeier, 2015). Such scrutiny and its related self-imposed censorship will only further lessen the impact factors of Russia's scientific literature and those impact factors are already low by international comparison. For example, the average citation rate for Russian scientific publications was 0.51 from 2008–12 whereas the G20 average during the same period was double, at 1.02 (Gokhberg and Kuznetsova, 2015). Many government and industry-level organisations in Russia remain largely unreformed and are less productive compared with similar research organisations in other leading OECD countries.

Factors affecting general competitiveness

The several factors that can affect a nation's global competitiveness are shown in Figure 8. In comparing those factors for Russia and Australia, Australia out-performs Russia in all areas apart from market size. Russia's large population serves as an internal market and source of labour for its industries. When combined with its large land mass and sizeable arable area, agriculture in Russia enjoys some natural advantages. However, relative to Australia, Russia is not well served by its institutions, relative lack of innovation and inadequate business sophistication (Schwab, 2015).

Labour

The official unemployment rate in Russia has edged upward following the rapid lowering of energy prices at the end of 2014; noting however that to Russia's credit, its unemployment rate was at a record low of 4.8 per cent during August 2014. The unemployment rate in Russia during 2016 is around 6.5 per cent (Figure 9), low by comparison with the situation in several other EU countries. However, Russia's labour market faces a number

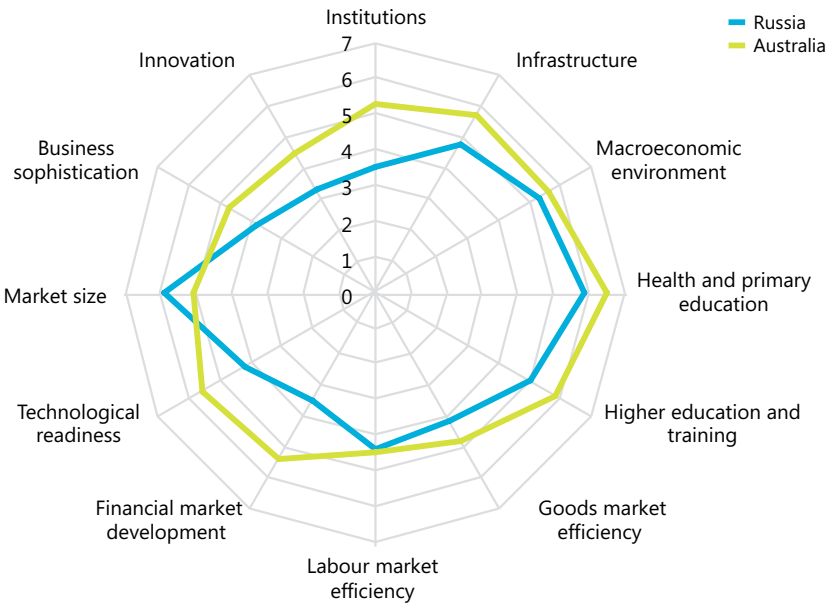


Figure 8 Factors affecting the global competitiveness of Russia and Australia

Source: Schwab (2015)

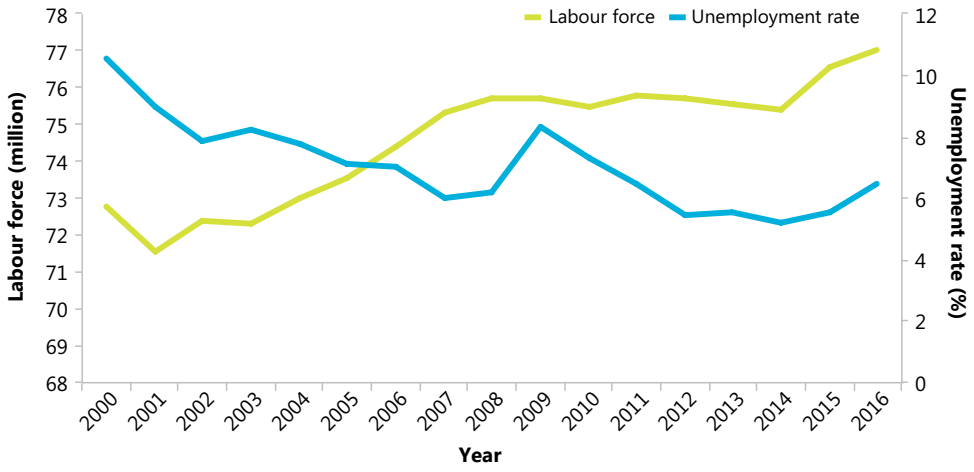


Figure 9 Labour force and unemployment levels since 2000
Source: OECD data

of structural weaknesses, such as growing youth unemployment, especially among rural youth. In the Central District in which Moscow is located, unemployment is almost 50 per cent lower than in the rest of Russia.

In order to support employment, the Russian government provided 52bn RUB ($780m at the USD exchange rate in May 2016) of labour subsidies during 2015 with those subsidies favouring large enterprises. However, under-employment remains an issue in Russia. Rather than reduce their workforces, most employers prefer to lower workers' wages, reduce their working hours or send staff on unpaid leave. According to forecasts of Russia's Ministry of Economic Development, real wages in the public sector during 2015 declined by more than 12 per cent and by 10 per cent in the economy as a whole.

There is limited financial support for the unemployed, in spite of almost a quarter of all unemployed people being under 30. The number of unemployed people under the age of 24 in Russia is five times greater than the number of unemployed 30–49 year olds. This trend in youth unemployment is also observed in many nearby EU countries. In the Eurozone unemployment for under 25s averaged around 23 per cent during 2015.

Credit

In Russia, inflation and poor access to finance cause businesses to face, by international comparison, high rates of interest on borrowings (Figure 10). Following the collapse of oil prices during late 2014, and the subsequent depreciation of the rouble, short-term interest rates became especially problematic during 2015 and remain relatively high during 2016. In businesses like agriculture, which depend on purchasing production inputs and machinery, access to credit is important. If interest rates, short or long term, are high then gaining access to sufficient credit and servicing that debt can become problematic. These can result in crop yields being lower than otherwise would be the case if interest rates were low, as easier access to credit would facilitate the purchase of additional inputs, such as fertilisers, which can boost crop yields.

High and uncertain interest rates also limit expenditure on capital inputs, so upgrading farm machinery and on-farm grain storage facilities or expanding the size of the farm business via capital investments are made more difficult. Nonetheless, in spite of these financial restrictions crop yields and the volume of crop production in Russia continues to increase.

Geographic, ethnic and social diversity

Russia has significant differences between regions. More than 80 per cent of its population lives in the western part of the country, and nearly 73 per cent of Russians live in cities (World Bank, 2012). Hence, apart from western Russia, much of the country is sparsely populated, although since the mid-2000s Russia has been slightly deurbanising. During May 2016, President Putin signed a law giving each person a hectare of free land if they moved to Russia's far east. The land would remain tax-free for five years, after which the owners could sell or rent the property. Only five per cent of Russia's population resides in that region and the Russian government is concerned illegal Chinese immigrants could rapidly become the region's dominant ethnic group. During the past few years, around 1.5m Chinese people have illegally settled in the region and legal Chinese immigration also has increased.

Russia's population has plateaued since the mid-1990s (Figure 11), with ethnic Russians making up 81 per cent of the total population, according to the 2010 census. The remainder of the population comes from 160 different ethnic groups.

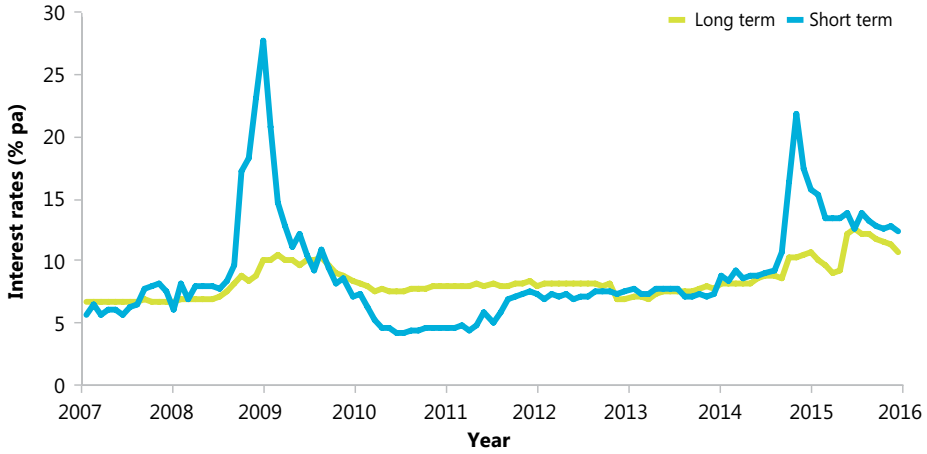


Figure 10 Short-term and long-term interest rates in Russia since 2007

Source: OECD data

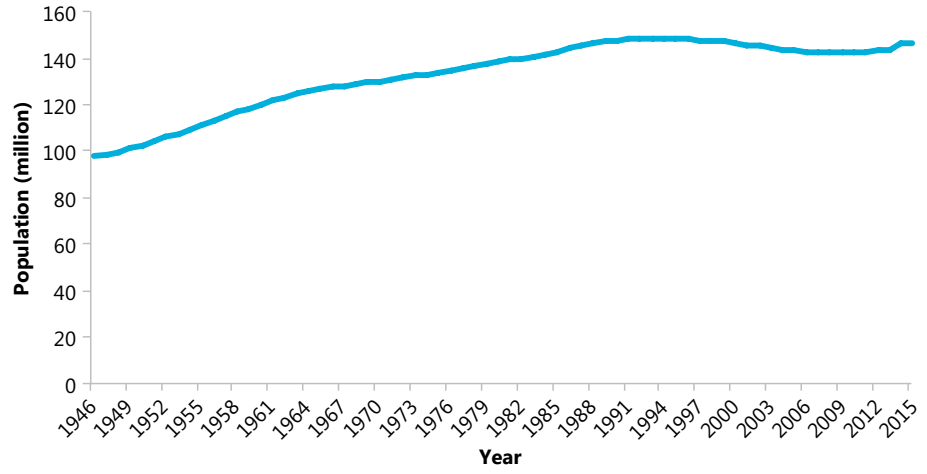


Figure 11 Russia's population post-WII

Source: www.livepopulation.com/country/russia.html

As of 2014, Russia's total fertility rate was 1.75 children per woman, the highest among eastern European countries but still far below the replacement rate of 2.14. During 1990, just before the dissolution of the Soviet Union, Russia's total fertility rate was 1.89 and it subsequently declined to a historic low of 1.16 during 1999, after which it has recovered to its current level. The maintenance of Russia's population is via immigration. Around 300,000 legal immigrants enter Russia each year, most settling in Russia's larger cities and occasionally causing ethnic tensions. In addition, there are an estimated 4m illegal immigrants from the ex-Soviet states now residing in Russia.

Just as the population is unevenly distributed across Russia, mostly centred in western Russia, so is economic activity. During 2010 Moscow had the country's highest gross regional product. Muscovites had an income per capita of about 730,000 roubles, many times that in other regions and two and a half times the national per capita income. Much of the difference in regional economic performance is caused by population size differences, different endowments of natural resources and the outcomes of government policy, such as the majority of Russia's publicly-funded researchers being located in the Moscow and St Petersburg regions.

Since the mid-1990s Russia's population has decreased by 5m to be around 143.4m during 2016. During 2013, life expectancy among the rural population was three per cent lower than in city populations. Agriculture remains the dominant employer in rural regions, but agricultural wages are about half the average wage in Russia. On the positive side, the low cost of rural labour helps lower the cost of grain production in Russia. By contrast, Australian grain growers are faced with much higher labour costs though admittedly, use fewer units of labour in the production process.

Russian agricultural industry structure

Grain production in Russia

The post-Soviet history of grain production in Russia mimics the experience of Ukraine and Kazakhstan — an initial seismic shock, causing a collapse in grain production, followed by an upward trend in production until now.

The Soviet Union featured a complicated system of grain trade across member states' borders, coordinated in the (ostensibly) best interests of the union as a whole, with less focus on managing the supply and demand in each individual state. With the sudden and uncoordinated removal of these arrangements, along with cessation of various subsidies affecting grain production, it was natural that uncertainties and a state of flux would persist until each now-separate state or country could recalibrate production along free market lines.

Following collapse of the union, a perfect storm arose of high input prices (via a collapsed rouble) and low grain prices (due to dysfunctional market mechanisms and lower feed demand). These conditions caused a significant contraction in grain production. In addition, Soviet-era production had little focus on efficiency or yield per hectare, so this contraction was exacerbated by a free-market style move away from uneconomic production on poorly located or poor-quality land. Ten years after the collapse of the Soviet Union, the area devoted to grain production had decreased from a zenith of 125m ha, to around 70–80m ha.

Yet among the Black Sea nations, Russia was, and continues to be, by far the biggest producer of grain. By illustration, Figure 12 shows the remarkable growth in exports of Russian wheat, its main export grain, since 2001. However, this graph also shows that both production and exports of Russian wheat are volatile, subject to not only the weather, but also government policy, which can be equally variable. Climatic events in Russia and sudden bans on wheat exports imposed by Russia's government have had ramifications on the global wheat market, such is the typical magnitude of Russian wheat production. Hence, Russia can often be a source of wheat exports, but can also produce price volatility when its production is low and its government restricts exports. As Australia is a wheat-centric grains producer, this has important implications for Australian wheat growers and for the broader grains industry.

It is for this reason that AEGIC contends there is now an increased need to monitor the changing grains landscape in Russia and her nearby wheat-producing countries. This monitoring is not solely aimed at assisting the formation of well-informed competitive strategies in key markets, but will also enable the Australian grains industry to gain greater visibility of the factors influencing the demand for Australian grain and the prices Australian growers receive.

Although Russia differs in many ways from its Black Sea neighbours, it nonetheless does have some similarities. For example, traditional grain growers in Russia and Ukraine are being replaced by commercial 'agroholdings' (or agriholdings), which are large, vertically-integrated corporate enterprises, which can leverage economies of scale and modern farming practices to boost output and profitability. In comparison to smaller, traditional farmers, these agroholdings often have better access to finance and are more likely to employ state-of-the-art technology for best-practice grain production.

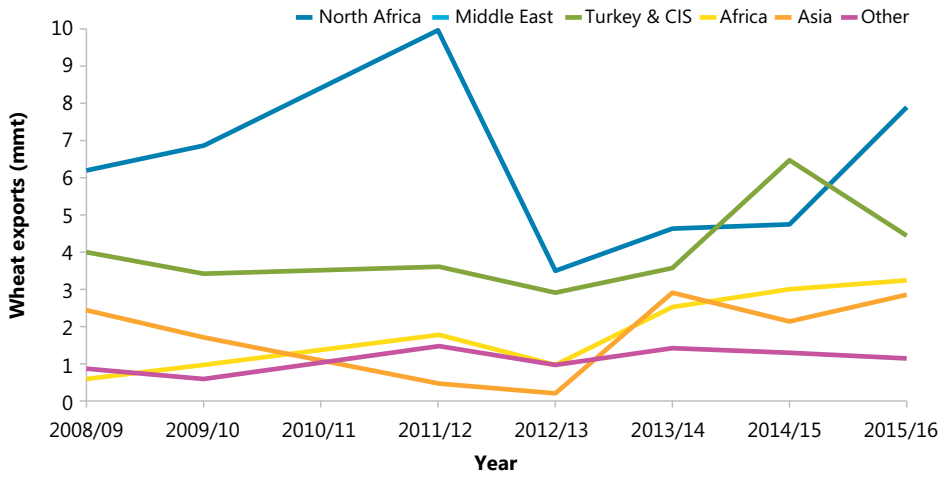


Figure 12 Russia's wheat export profile

Source: Based on data in Rylko (2016)

Since the collapse of the Soviet Union during 1991, wheat yields in Russia have been hampered by sub-optimal fertiliser application, which has been largely due to a lack of access to pre-planting credit. However, with the emergence of well-financed agroholdings, Russian wheat is now produced using more than twice the amount of nitrogen (N) than was typical at the turn of the millennium.

Like Ukraine, Russia is also experiencing economic pain, albeit for vastly different reasons and perhaps not to the extremes of volatility seen in Kiev. Indeed, perhaps the greatest point of mutual resemblance is the unstable geopolitical climate that prevails in the wake of Ukraine's alignment with western Europe and the various flashpoints with Russia, which have resulted in Russia's annexation of Crimea, as well as near-civil war in parts of eastern Ukraine.

Liefert and Liefert (2015a) provide a useful overview of the agriculture sector in the Black Sea region up until 2013. However, as evidenced by the dramatic changes in Russia and Ukraine from 2014 onwards, the region can be subject to rapid and sometimes poorly forecasted changes. Since 2014, the rouble has depreciated by 50–60 per cent against the USD and the Euro and thereby lifted the competitiveness of Russian grains in international grain markets. For example, Russia's principal grain is wheat and its exports have risen to record levels during 2015 and 2016 (Figure 13).

Aside from the large macroeconomic changes since the end of 2014, which have impacted on the agricultural sector, the changes that have most affected Russian agriculture have been those following the collapse of the Soviet Union during 1991. Lioubimtseva *et al* (2015) outline how from 1991 to 2001, GDP in the Russian Federation, Ukraine and Kazakhstan declined by 65–67 per cent, average life expectancy declined from 69 to 65 years, and male life expectancy in rural areas of the Russian Federation declined from 61 to 53 years (Prishchepov *et al*., 2013).

Impacts were particularly pronounced in rural regions, where state support of agriculture ended and rural development ceased almost entirely (Prishchepov *et al*., 2013). Centrally-planned institutions and existing agricultural policies disintegrated, uncertainties arose over the legal status of land and agricultural subsidies and other forms of governmental support declined sharply (Lioubimtseva and Henebry, 2012).

When under former Soviet control, agriculture received annual subsidies worth 10 per cent of Soviet annual GDP. Prices of agricultural inputs were set below their true cost of production and prices for agricultural commodities, particularly livestock products, were set well above world prices. For example, Liefert *et al* (1993) reveal that during 1986, prices for beef and poultry were set at only a quarter and two-thirds respectively of their world prices. But following the demise of the Soviet Union, these support mechanisms mostly evaporated. Domestic prices increased to reflect more accurately actual costs of production and input prices rose relative to output prices, lessening farmers' terms of trade (the ratio of prices received to prices paid).

The OECD (1999) reports that during 1991 to 1997 Russian farmers' terms of trade fell by 75 per cent. To illustrate the practical magnitude of this change Liefert and Liefert (2015a) give the example of a Russian farmer who in 1991 could swap 0.3t of wheat for a tonne of nitrogen fertiliser yet by 1997 1.4t of wheat were needed to swap for a tonne of nitrogen fertiliser. This strong adverse shift in farmers' terms of trade following the collapse of the Soviet Union caused a massive reduction in agricultural output. By illustration, average annual output of agriculture in Russia during 1996–2000 was only 60 per cent of the output volume in 1990, with meat production being worse affected than grains production.

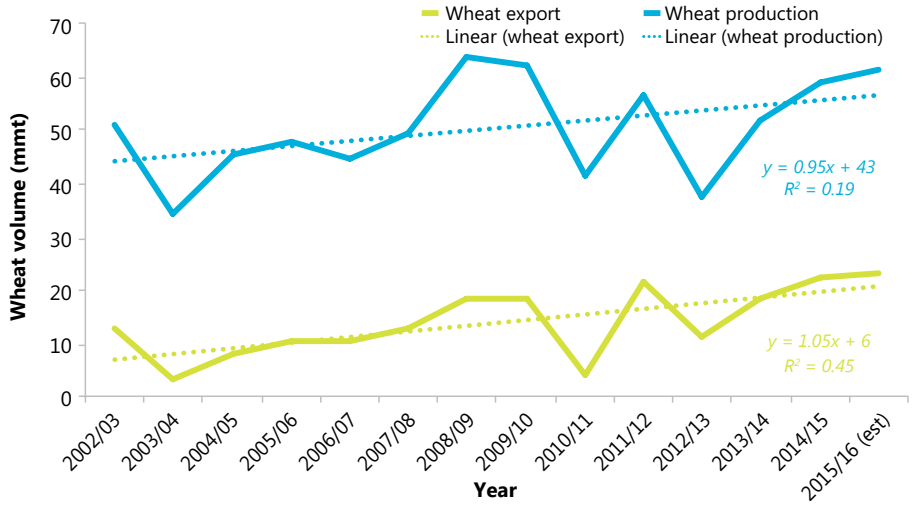


Figure 13 Annual Russian wheat exports and production: 2002/03 to 2015/16 (est)

Source: USDA World Agricultural Supply and Demand Estimates

The more than halving of Russia's livestock sector output consequently reduced that sector's demand for feed grains significantly. For example, grain production in Russia fell from an annual average of 95mmt between 1987 and 1991 to 63mmt between 1996 and 2000. Rather than import more animal feed to support its livestock production, Russia increased its meat imports and curtailed domestic production of feed grains and meat.

Following the collapse of the Soviet Union, grain production restructured away from feed grains (barley, oats) into wheat and oilseeds, with their surpluses being exported as production volumes gradually recovered. One main trigger to the rebound in grain production was a change in Russian government policy during 2005 that increased government funding to agriculture. During 2005–10 the Russian government increased its support to agriculture, in real terms, by 135 per cent with the livestock sector being a focus of additional support. Restrictive tariffs were introduced on imports of beef, pork and poultry; increasing domestic demand for feed grains, such as corn. Fuelling the enhanced domestic availability of grains was a tax on wheat exports during 2008 and a ban on exports of wheat following the poor grain harvest of 2010. These export restrictions lifted the domestic availability of grains to households and the livestock sector. However, in spite of the taxes and export bans placed on wheat, Russian wheat exports nonetheless increased at an average annual rate of more than a million tonnes (Figure 13) from 2002/03 to 2015/16.

Table 2 presents the changes in the key variables that influence Russian grain production. The figures are the average annual values of these variables during 2001–05, expressed as a percentage change in their average annual value during 1996–2000. The percentage changes are based on values expressed in real terms.

During 2001–05, compared with 1996–2000, Russian grain prices, agricultural input prices (fertiliser, machinery, fuel and certain agricultural services), and government subsidies all moved in directions that decreased, rather than increased, grain output. Grain prices fell five per cent, input prices rose 13 per cent and agricultural subsidies dropped 26 per cent.

The increase in input prices contributed to the decline in input use. Yet during 2001–05, compared with 1996–2000, Russian average annual grain production was 21 per cent higher. Grain production increased, not due to greater areas of production, but principally due to favourable weather conditions that supported a rise in use of inputs, especially fertilisers. Every year from the second half of the 1990s, except for 1997, displayed unfavourable weather (rain and temperature conditions) for grain production, while every year between 2000 and 2012 displayed favourable weather except during 2003, 2010 and 2012. Across the period 2000–14 fertiliser rates applied to grains doubled.

Table 2 Key variables affecting Russian grain production (2001–05 versus 1996–2000 conditions)

Variable	Change (%)
Grain production	21
Area harvested	-1
Fertiliser use	42
Yield	24
Grain prices	-5
Agricultural input prices	13
Fertiliser prices	-6
Government subsidies to agriculture	-26
Input subsidies affecting grain production	-39
Fertiliser subsidies (within subsidies to all agriculture)	-11

Source: Liefert and Liefert (2015b)

Not explicitly captured in Table 2 is the role of farm business structures in facilitating greater input use and the capitalising on favourable weather years for grain production. New agroholdings and entrepreneurial small-to-medium-sized farm businesses are a force for productivity-enhancing technological change in Russian agriculture through use of higher-quality seeds, higher fertiliser application rates (and use of soil testing in determining fertiliser rates) and use of modern machinery. These businesses display superior management with a focus on cost-efficiency and profitability. Figure 14 shows the increasing share of cereal production stemming from agroholdings and small farm businesses.

Consistent with the trends in Figure 14 Liefert and Liefert (2015a) explain how at the end of the Soviet era two types of large farms dominated agricultural production: collective farms (kolkhozy) and state-owned farms (sovkhozy). Additionally, most rural households had small plots, typically less than 0.5ha for domestic or commercial use. Despite their small size, their intensive use allowed these household plots to produce a sizeable share of Russian crop production (Table 3).

In the post-Soviet years, three main sorts of farm enterprises have dominated; the former state and collective farms, household plots and new private/smallholder farms. The state and collective farms became corporate farms, either joint-stock companies or some form of co-operative or collective association. As shown in Table 3 the land share of these former state and collective enterprises diminished while shares for smallholder farmers and household plots gradually increased.

The expanded role of household plots, as shown in Table 3, requires some explanation. Their increased importance was not due to growth in the size of household plots, but rather from the plot-holders' ability to either lease land from the local government or use the free public meadows and pastures to graze their livestock, which then freed up household plots for alternative production. The rise in the household plots' share in

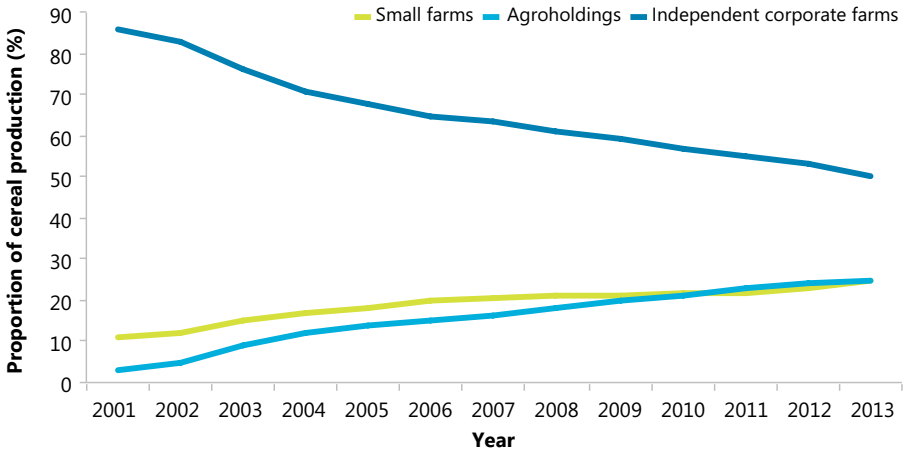


Figure 14 Change in Russian farm organisational structures

Source: Based on data in Rylko (2015)

Table 3 Share of crop output by farm type and farmland in Russia (1990–2014)

	1990	1995	2000	2005	2010	2014
Share of crop output (%)						
Large agricultural enterprises	75.9	45.1	47.9	44.0	40.8	42.8
Household plots	24.1	52.4	47.8	46.5	48.0	42.1
Small farms	-	2.5	4.4	9.6	11.2	15.1
Share of farmland (%)						
Large agricultural enterprises	98.1	89.4	86.1	78.4	69.5	n/a
Household plots	1.8	5.2	6.0	10.5	16.9	n/a
Small farms	-	5.4	7.9	11.1	13.5	n/a

Source: Russian Federal Service of State Statistics, 1987–2012. Data abstracted from Liefert and Liefert (2015a)

agricultural land included the growth in the number of garden plots tended by the general population.

The marked lift in the share of output coming from household plots was also due to a decline in output from the former state and collective farms. In addition, corporate farms often under-reported their production to avoid paying taxes on profits. Private smallholder farms also increased their share of output and land use. These smallholdings mainly belong to workers on the former state and collective farms. These workers used their ownership vouchers to obtain land and become private farmers. These small farms typically range from 50–150ha in size, in contrast to the large agricultural enterprises that average in size around 5000ha. The smallholdings specialise in bulk crops, such as cereals and sunflower seeds.

Large agroholdings (see Figure 14) displaced some state and collective farms and these large corporate businesses have become an important source of crop production (Rylko *et al.*, 2008; Wandel, 2009), alongside the household plots. The large agroholdings are vertically-integrated enterprises, which mostly combine primary agriculture, processing and distribution activity. Typically, these agroholdings combine capital investments with modern farm technologies and superior farm management. These agroholdings control about a fifth of the arable land in Russia.

Whether or not these agroholdings are unambiguously the most profitable organisation structure in Russian agriculture is not yet certain. Farm analysis studies to date are inconclusive about their relative profitability (Rylko *et al.*, 2008; FAO, 2009; Hockmann *et al.*, 2009; Deininger *et al.*, 2013). By being vertically integrated, agroholdings can lower transaction costs among contracting parties and can align business incentives and capitalise on enterprise complementarities. Agroholdings, by virtue of their size and local importance, also can receive political and regulatory support from local and provincial officials. However, diseconomies of size can occur and the complexity of managing a multi-faceted business can impose additional costs.

Government activities in the agricultural sector

For much of its history in the 20th century, the Russian economy was known as a 'command and control' economy in which the central government and its agencies played a powerful and constant role in influencing sectoral activity, including farm production. Perhaps not surprisingly, even in the post-Soviet era, the hand of government still rests heavily on many aspects of economic life, including agricultural activity.

In the Putin/Medvedev era agriculture received special focus. Early in his first term in power President Putin stated;

> *"Our first-order task is to raise the volumes of food output to the levels they were at the end of the 1980s and at the beginning of the 1990s, and to appreciably reduce the country's food dependence on imports".*

Soon after, a strategic document was released, titled *Basic Directions of Agrofood Policy to 2010*. The stated strategy was to strengthen the rural economy and stabilise food production by:

- improving the financial status of agricultural enterprises through debt reduction and increased budgetary allocations, allowing them to expand production
- using custom and tariff policies to ensure the income growth of domestic food producers
- allowing domestic producers to compete with foreign imports by greater regulation of the grain market
- fostering credit organisations to improve access to finance
- improving the stock of agricultural machinery and changing the process of leasing agricultural machinery.

An agroholding model was introduced and supported. The Russian government considered self-sufficiency in food production to be an essential pre-condition for national security and agroholdings were considered the best way to accelerate farm production, rather than rely on greater output from very small family farms. The Minister of Agriculture at the time (Aleksey Gordeev) commented; *"no one should doubt the priority of large producers over small ones"* and; *"the future of agriculture is large enterprises and the vertical integration of agro-industrial organisations"*. The success of this approach was evidenced by 82 per cent of agroholdings and large-scale farms being reported as profitable during 2012.

Within the Ministry of Agriculture, a section providing crop insurance (Bobojonov *et al.*, 2014) was created, with the government providing dollar-for-dollar support for premiums. However, there is only around 25 per cent participation, in spite of the insurance being able to be used as credit collateral where a farm has few assets, and the producer indemnity/premium ratio is 1.09, which means the farmer gets back $1.09 for every $1 they pay in insurance. The area of crops insured in 2014 was 12.8m ha, or 17.7 per cent of the total area and 25 per cent of farms participating in crop insurance. By contrast, in the USA, the percentage of the total crop insured is more than 70 per cent.

Another aspect of crop policy was the introduction of a price stabilisation fund. A two billion rouble intervention fund was introduced to stabilise grain prices, whereby the government purchased grain in bumper years and released this grain during periods of shortage.

Another agricultural policy focused on animal production, but had implications for grain production. The policy statement was titled *On Measures for Accelerating the Development of Animal Husbandry as a Policy Priority for Attaining Food Security in Russia*. The measures included subsidies on the import of breeding stock, subsidies on infrastructure for dairying, financial support for the establishing family-run dairy operations and large financial support to expand pork and poultry production.

During 2012, the Government formulated a plan for the 2013–20 period, with food security as its underlying goal. The plan comprised several mini-goals of increasing (i) food production by 21 per cent, (ii) processed food production by 35 per cent and (iii) investment in agriculture by 42 per cent. The Russian government allocated 1.5 trillion rouble (US$23bn) to this plan. Most support has been directed at livestock production.

It is widely acknowledged that often this support distorts the nature of international trade in agricultural products. Developed countries, primarily the USA and the EU, have implemented agricultural policies that affect the competitiveness of international trade both directly and indirectly (FAO, 2012a). During 2013, the agricultural GDP share of government support was 39 per cent in the EU and 36 per cent in the USA (Erokhin, 2015). These percentages translate into about US$80.6bn and US$74.2bn of support for the agricultural sectors in the EU and the USA respectively. By contrast, for its accession to the World Trade Organisation (WTO), Russia agreed to limit its support to a maximum of US$9.9bn during 2012, gradually tapering to US$4.4bn by 2018.

According to the OECD, the Producer Support Estimate (PSE) is;

> *"...an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income".*

During 2011, the PSE in Russia reached 21.7 per cent, which was more than the OECD average (18.8 per cent) (Erokhin and Ivolga, 2012). In general, Russia and the EU provide high levels of producer support via their government policies (Table 4). The USA, Canada and Kazakhstan provide less, but still significant, support to their agricultural sectors. By contrast, the agricultural sectors in Australia and Ukraine receive little support, with the Ukrainian sector in fact being a source of transfer payments.

Table 4 Producer Support Estimates (2014)

Country or region	PSE as a % of farm receipts	PSE as a % of GDP
Russia	17.2	~0
EU	18.4	0.9
USA	9.9	0.5
Canada	8.9	0.3
Australia	2.3	0.2
Ukraine	-8.2	-0.2
Kazakhstan	6.5	~0

Source: OECD. See www.oecd.org/tad/agricultural-policies/producerandconsumersupportestimatesdatabase.htm

The bulk of government support to Russian agriculture is via tariff regulations. About 62 per cent of Russia's agricultural and food commodity imports are affected by tariffs greater than or equal to 10 per cent. Such tariffs penalise the importation of these farm and food products and bestow commercial protection on Russia's domestic industries, which produce those same commodities. As these tariffs gradually reduce under WTO agreements, greater importation of those commodities is likely to occur, triggering structural change in those sectors in Russia.

Russia's decision to join the WTO during 2012 is unleashing a raft of changes (Erokhin and Ivolga, 2011), including diminished protection for both local production and local food processing. Hence, up until the recent massive devaluation of the rouble and the imposition of trade sanctions by Russia, food importation was increasing as cheaper overseas suppliers of processed agricultural goods entered Russian markets. Russia's food processing industries, especially meat and dairy, were impacted. In response, but more especially as a retaliation to trade sanctions imposed on Russia by Western nations following Russia's forced annexation of Crimea, Russia introduced, on 7 August 2014, an import ban on beef, pork and poultry meat, dairy products, fruits and vegetables originating from the USA, the EU, Canada, Australia and Norway. On 25 July 2015, Russia extended this import embargo until 5 August 2016. This ban also has been extended to Iceland, Liechtenstein, Albania and Montenegro.

The impact of these bans has caused the value of agri-food exports to Russia from the €28 to lessen by 43 per cent, being €11.0bn in 2013/14 compared with only €6.3bn during 2014/15. The bans have fuelled food and general inflation in Russia and lessened food availability to the local population. It has provided, however, additional export opportunities for countries like Brazil, which are not subject to the ban, and production opportunities have arisen for Russian producers of foodstuffs subject to import bans.

While agriculture accounts for only four per cent of Russia's GDP and around seven per cent of exports, the downturn in the energy sector has led the government to view agriculture as a future engine room of economic growth. According to Deputy Finance Minister, Maxim Oreshkin;

> *"New drivers for growth have already appeared in the economy — agriculture, chemicals, the food industry, domestic tourism".*

It is not difficult to see the appeal of this notion, as the benefits of a healthy agricultural sector extend beyond its contribution to economic growth. Agriculture is of great social importance outside the major urban centres, providing not only the main source of employment, but a range of other, less measurable benefits, such as social cohesion and a sense of purpose, which are in turn, powerful drivers of well-being. Like most governments around the world, the Russian government views social cohesion at least partly as a means to an end, rather than the end itself. As the Arab Spring and other popular uprisings have shown, social unrest can easily lead to political unrest.

A strong agricultural sector in Russia also can provide food security, self-sufficiency and exportable surpluses, which generate foreign currency. Russia is blessed with energy resources and ample arable land, which facilitate food production and make Russia less vulnerable in any conflict. In addition, its self-sufficiency in energy and food production, complemented by its ability to export affordable grain, strengthens its bargaining position in any possible dispute with many other countries or intergovernmental organisations.

As evidence of the growing importance of the grains sector in Russia, during 2012 Russia produced 20 per cent of the world's sunflower oil, 11.2 per cent of the barley and 5.9 per cent of the wheat. During 2015/16 Russia has emerged as the world's second-largest exporter of wheat behind Europe. Nonetheless, despite this high volume of domestic grain production, Russia remains a net importer of agricultural commodities, with its dependency on imports increasing up until the import ban on many products. Russia's exports of agricultural commodities, as calculated in USD, were worth US$16.6bn during 2012, but agricultural imports were worth US$46.4bn. The main import items during 2002–12 were meat, milk, dairy products, beverages and sugar. Beef, pork and poultry combined to make up more than 19 per cent of the agricultural imports during 2012, followed by alcoholic and non-alcoholic beverages at 6.3 per cent, cheese at 5.1 per cent and tobacco at 4.2 per cent. Import deliveries of meat (beef, pork and poultry combined) increased four-fold from 2002–12, while imports of beverages and cheese increased almost five-fold and sugar increased three-fold. However, the imposition since 2014 of an import ban on many foodstuffs from several Western nations has favoured local production. For example, during 2012 pork imports exceeded 1mmt whereas during 2015 the volume of pork imports was only 0.3mmt; and local pork production during the same period increased by more than 0.4mmt (USDA, 2015). However, due to the problematic macroeconomic conditions, pork consumption in Russia declined from 3.2mmt in 2012 to 2.9mmt in 2015. A case

against the Russian ban on pork imports from the EU is before the WTO and its ruling will be public in mid-2016.

Besides instituting import bans, the Russian government also introduced, during July 2015, a floating tax to restrain wheat exports, which were boosted by the rapid depreciation of the rouble during 2014 and 2015. Later in October 2015, the Russian government revised the taxation formula, thereby allowing traders to increase wheat shipments to foreign markets. The government increased the deductible portion of the wheat export duty from 5500 roubles (US$84) to 6500 roubles (US$99) per tonne and decreased the minimum duty from 50 roubles to 10 roubles per tonne (USDA, 2015c).

The imposition of the tax has caused more wheat to be available to Russia's domestic market than otherwise would be the case. However, the magnitude of the rouble's depreciation has caused a surge in the domestic price of wheat, due to the lift in the export parity price. Understandably, some local bread manufacturers have turned to low-quality, low-priced wheat for making bread.

To boost farm production, from 2000 onwards the Russian government has provided substantial interest rate subsidies to qualifying farmers for their purchase of operating items. Further governmental involvement in the grains industry occurs through a government-owned grain marketing company. Establishing such a state, or parastatal, grain company has similarly occurred in other Black Sea countries. In Kazakhstan, Russia and Ukraine, these companies are called the State Food Contract Corporation, United Grain Company and Agrarian Fund, respectively. The officially-identified functions of these companies are: to increase each government's involvement in the domestic grain market, increase grain exports and improve the physical infrastructure for the grain sector. During May 2012, the Board of Directors of Russia's United Grain Company chose Summa Group as a strategic investor, purchasing a major but non-controlling stake in the company. The United Grain Company operates across 18 regions in Russia. It owns and operates 12 grain elevators with a total capacity of 1.8mmt and 14 processing plants with a capacity of 1.2mmt. The Company also owns one of Russia's largest port handling companies — JSC 'NCK'. The United Grain Company carries out the federal government's grain purchase and sales interventions.

Besides establishing the United Grain Company, the Russian government also continues to invest in a range of technical and educational institutions that train agricultural scientists, engineers and technologists who serve Russia's grains industry. However, funding support has not always been a consistent priority for the Russian government. For example, due to lack of government funding, Russian applied sciences all but ceased functioning between 1990 and 2005. Nonetheless, grain production has increased through acquiring equipment and technologies linked to increased private investment in agriculture. From 2006–11 average annual capital investments in agriculture, in constant 2006 dollar terms, were around 210bn roubles (Epstein, 2015).

Wheat breeding and agricultural science in Russia

A historical perspective

The current nature of wheat breeding in Russia bears the influence of past policies. Before the disastrous agricultural policies of Stalin, Russia was one of the global leaders in wheat breeding. Even before the development of a science-based, systematic process for improving wheat cultivars, Russia's peasantry had, for several centuries, used rudimentary techniques to identify the most vigorous plants, while culling the rest. These wheat cultivars displayed useful characteristics, such as disease resistance and adaptability. Canadian wheat farmers used these cultivars as they were similarly suited to the Canadian environment. To this day, historical Russian varieties are a key part of the genetic background of Canadian wheats.

During the early 20th century wheat breeding in Russia moved from peasants' fields to the laboratory, as Russia started an important period of institution building, underpinned by formal reliance on the scientific method for plant selection. It was during this period, up until the end of World War I, that Russia established important research organisations, such as the *Institute of Plant Industry* (now known as the *Vavilov Institute of Plant Industry* — see Breakout Box below) in Leningrad[2] and the *All-Union Academy of Agricultural Science* (*also known as VASKhNIL, or ВАСХНИЛ — a derivation of V.I. Lenin*) in Moscow.

A key person in Russia's plant breeding history was Nikolai Vavilov. By the 1920s he had become internationally renowned, taking up leadership roles at both the aforementioned institutions. Vavilov's work benefited nearby nations and those further afield.

2 Before 1914, Leningrad was known as St. Petersburg, before being changed to Petrograd and then changed again to Leningrad during 1924. Then, when the Soviet Union collapsed in 1991, it was changed back to St. Petersburg.

Vavilov — The father of modern seed banks

By 1977 Vavilov's reputation was officially restored.
Source: Shutterstock

Nikolai Vavilov was a polymath, whose contribution to modern-day agriculture extended beyond wheat breeding and beyond Russia. He is often acknowledged as one of the 'fathers' of the seed bank concept, helping to secure genetic material beyond the reach of war and politics.

In addition to his numerous other commitments, Vavilov played an instrumental role in founding the *Institute* in Leningrad, which established a large-scale seed bank. Whereas the Svalbard Global Seed Vault in Norway receives much media coverage, the Institute still has the largest bank of plant genetic material in the world. This is due largely to the efforts of Vavilov, who personally gathered more than 200,000 seeds from around 65 countries, bringing the samples back with him for safe-keeping in St. Petersburg. For a country like Russia, with their history of regular drought and occasional famine, the importance of this seed collection cannot be overstated.

A remarkable illustration of the Institute's commitment to seed preservation occurred in World War II during the siege of Leningrad, when the Nazis blockaded the city to starve its citizens, with the aim of softening the city for easier capture. Fearful of losing the invaluable collection of seeds to both invading Germans and starving citizens, a number of Vavilov's proteges and acolytes barricaded themselves in the basement so nothing could get either in or out. As the siege wore on, and with no access to food apart from the seeds, these heroic individuals ultimately chose to starve themselves to death, rather than use the seed bank as a source of food.

Disturbingly, the outstanding legacy of Vavilov was not respected inasmuch as another geneticist, Trofim Lysenko, advanced a pseudo-scientific competing theory that unfortunately became popular and dismissive of Mendelian genetics. Lysenko tailored his 'theory' to align with the prevailing politics, ingratiating himself with Stalin. Then, whenever someone dared to question his theory, he used his rapport with Stalin to have them imprisoned in exile and in some cases, sentenced to death. Hence, as would be expected, Vavilov and Lysenko came into conflict. In 1941 Vavilov was sentenced to death as a 'political enemy' of Russia. While he was eventually spared execution, Vavilov was imprisoned and ultimately died of starvation in 1943 — an ignominious and unjust end for someone who had so greatly advanced wheat breeding in Russia. However, when Stalin was replaced as Russia's leader, Lysenko was eventually denounced as a fraud, and Vavilov's good name was posthumously restored.

While the focus of breeding in Russia during the past century has been on yield (through improved vigour and disease resistance), which is no different to Australian plant breeding, the motivations for doing so are different. Whereas the aim of wheat breeding in Australia is to improve grower returns by supporting the export competitiveness of Australian grain, in Russia the aim is more about ensuring Russia's self-sufficiency in food production. Any shortfall in grain production in Russia leaves it reliant on grain or grain-based food imports, thereby potentially weakening Russia's national security. As part of its food security policy, the Russian government has maintained grain reserves of 2mmt and 3.1mmt in 2014/15 and 2015/16 respectively.

A long, slow decline — plant breeding in the post-Soviet era

While plant breeding in Russia has never returned to the halcyon days of Vavilov, nevertheless during the Soviet era it enjoyed a privileged status characterised by ample funding, albeit with questionable effectiveness. However, with the fall of the Soviet Union during 1991 came dramatically lower funding and a greater influence of institutional vested interests.

Generations of plant breeders in Russia have experienced everything from international acclaim under Vavilov, through to Stalin's forced abandonment of genetic theory, to the uncertainty of funding in the post-Soviet era.

Wheat breeding in Russia today

The collapse of the Soviet Union saw VASKhNIL become the *Russian Academy of Agricultural Sciences* (RAAS), and today this organisation is responsible for Russia's plant breeding program. The RAAS belongs to the *Russian Academy of Sciences* (RAS), a sprawling behemoth employing 45,000 scientists in 436 different research bodies, including the RAAS. The Ministry of Higher Education has the role of providing a steady stream of trained scientists, including plant breeders and geneticists. However, this model has a long history of operating under significant operational and financial constraints. A restrictive budget limits their ability to hire enough graduates and post-graduates to provide the functions critical to any plant-breeding program. Russian wheat breeding has therefore lacked the resources for critical functions, such as the technical extension activities necessary for facilitating adoption of new varieties.

During recent years the RAS has been heavily criticised. Even in *Nature* (2013) the view was expressed that RAS was;

> *"...burdened by a host of unproductive ageing scientists awaiting retirement and by many pursuing research of dubious value" (Nature 497, 420–421).*

In 2013 President Putin lost patience with the RAS and instituted changes causing the RAS to report to a newly-established federal department, which in turn reported directly to him. This new oversight arm of government ensured the Academy's US$1.9bn annual budget was directed in areas of maximum benefit. It is too early to draw any conclusions regarding the implications of these changes for wheat breeding, which is only one small part of a huge process of institutional change. The consensus, including from many scientists themselves, was that reform of some description was badly needed.

In Russia, since the collapse of the Soviet Union, the number of State-funded plant breeding centres has decreased but there still remains 42 breeding centres, most of which have breeding programs for winter wheat. More than 98 per cent of the spring or winter wheat area in Russia is sown to Russian-bred varieties and up to 50 per cent of the area of winter wheat is sown to 10 main varieties. Generally, about 20 per cent of registered varieties are sown on 80 per cent of the wheat area and varieties have long cycles of use, 13–15 years. Of the varietal seed farmers use, only about 10 per cent is certified. By comparison, in the EU between 50 and 80 per cent of seed use is certified seed. The share of substandard seeds underpinning major crops in many regions reaches 30 per cent, causing these crops to reach only 70–85 per cent of the yield potentially achieved through use of certified seed of the best varieties. Moreover, even the best domestic varieties of wheat, barley, rice, maize and other crops genetically are not sufficiently protected from many diseases such as Fusarium head blight and root rot, thereby worsening their yield variability.

Despite an increase in State funding since 2000, wheat breeding remains constrained by a shortage of funding and scientists, particularly young scientists. The system of training in agricultural universities is deteriorating and there is an increased likelihood of loss of continuity in scientific schools. Most breeding centres rely on sales of certified seed to help finance their operations. The breeding centres register new varieties and then enter into revenue agreements with seed companies that produce seeds for sale to farmers. However, most farmers avoid use of certified seed and instead use their own saved seed, thereby starving the breeding centres of funds. The legislation protecting copyright and providing breeders' rights is poorly enforced.

Generally, about 20 per cent of registered varieties are sown on 80 per cent of the wheat area and varieties have long cycles of use, 13–15 years.

Grain production in Russia

Crop area

Russia has abundant land resources. About 25 per cent of its land area, or 400m ha, is designated for potential use in agriculture (Nefedova, 2011). Much of this land, however, remains unused. At its highest point through the 1970s about 220m ha was used for agricultural production (crops, grazing, fallow, orchards), but this has since declined to about 195m ha in 2008 (Nefedova, 2011).

Just over half of the agricultural area across Russia is considered arable. The World Bank estimated the arable area of Russia to comprise 7.5 per cent of its total land area in 2015 or 120m ha (World Bank, 2015). Not all the arable area is used for cropping. In 2010 the total cropped area in Russia was about 78m ha (Nefedova, 2011).

In comparison, the World Bank estimates that six per cent of Australia's land area is arable, which equates to 46m ha. In 2015 the total cropped area of Australia amounted to about 67 per cent of arable area or 31m ha (ABS, 2015) — a similar proportion as in Russia. By way of contrast, the World Bank considers 17 per cent of the land area in the USA as arable (155m ha) and most of this (87 per cent — 135m ha) was cropped in 2007 (USDA 2016a).

Arable land is mostly found in the southern and western parts of Russia (Figure 15). Cold temperatures in the northern and eastern parts of the country, together with unsuitable terrain, set natural limits to the extent of the agricultural areas (Koroljeva *et al*, 2003). Cropping is concentrated on the belt of highly productive chernozem soils (black earths) that runs through southern and south-western Russia up via the south Ural and into western Siberia. There is also a tongue of black soil coming via South Urals and Western Siberia, up to Krasnoyarsk in the geographic middle of the country.

Five districts account for the bulk of Russian cropping (Figure 15) with areas in the Siberian District being more than 4000km from the grain export ports on the Black Sea. Grain and oilseed crops occupy about 75 per cent of the cropping area, with the remainder mainly taken up by fodder, sugar beet, tree crops and vegetables (Schierhorn *et al*, 2014; RFSSS, 2015).

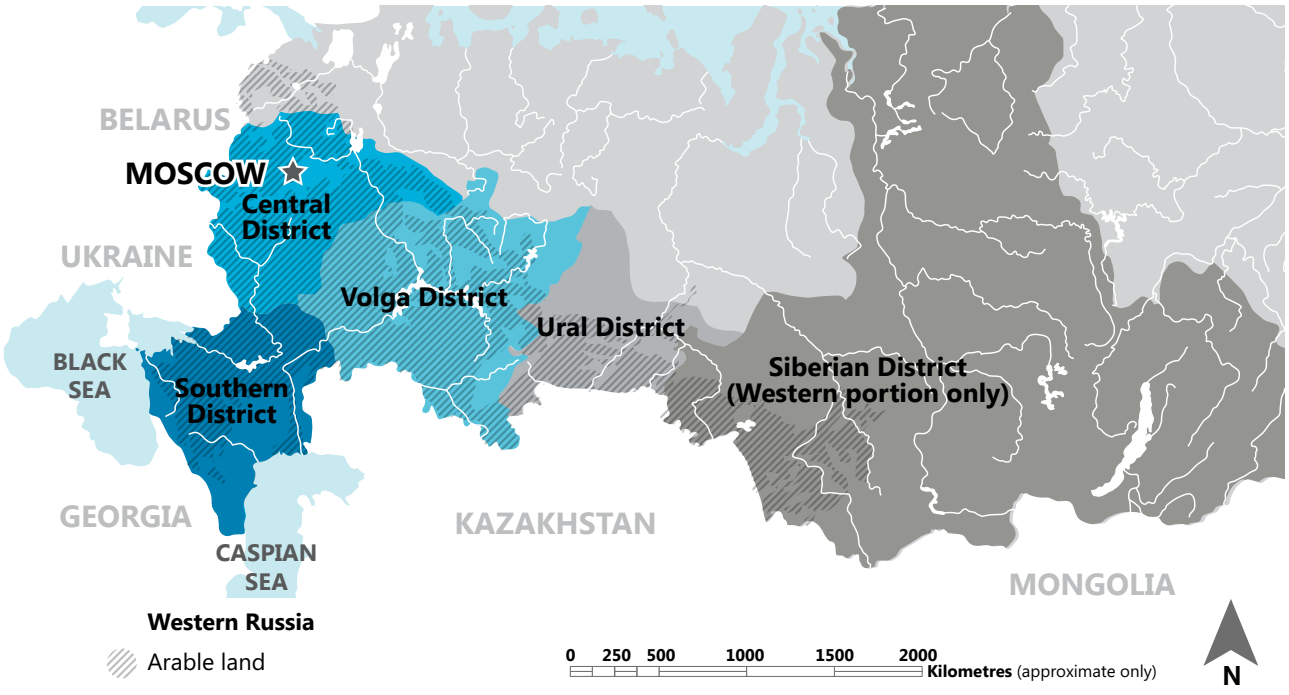


Figure 15 Limits of arable land in Russia

Source: Koroljeva IE, Vilchevskaya EV, Ruhovich DI. 2003. Digital Arable Land Map. Laboratory of Soil Information of the Dokuchaev Soil Institute, Moscow, Russia

The total area sown to grain and oilseed crops across Russia has averaged about 50m ha during the five years to 2014 (FAO). Wheat dominates cropping in Russia, but to a lesser extent than in Australia. About 46 per cent of the grain and oilseed cropping area in Russia is sown to wheat compared with about 57 per cent in Australia (FAOSTAT). Despite this smaller proportion, the large cropping areas of Russia translate into a larger area sown to wheat. On average, over the five years to 2014, about 23m ha of wheat were grown in Russia — about twice the area sown to wheat in Australia (about 13m ha) over the same period. Winter wheat is mainly grown in the Southern District and south-western parts of the Central Districts, while spring wheat dominates in the northern and eastern Volga, Ural and the Siberian districts.

Barley is the next most important grain or oilseed crop in both countries, occupying about 15 per cent of the area in Russia and 16 per cent in Australia, which corresponds to 7.5 and 3.7m ha respectively.

Sunflowers are the most important oilseed crop grown in Russia. They are the third-most widely-grown grain or oilseed crop overall, occupying about 6.4m ha, or 13 per cent of the area, on average, over the five years to 2014.

Canola is a relatively minor crop, occupying only about two per cent of the total grain and oilseed area. Despite being a minor crop, canola has expanded rapidly during recent years (Figure 16) and is still grown on nearly 1m ha in Russia or just under half the area sown to canola in Australia.

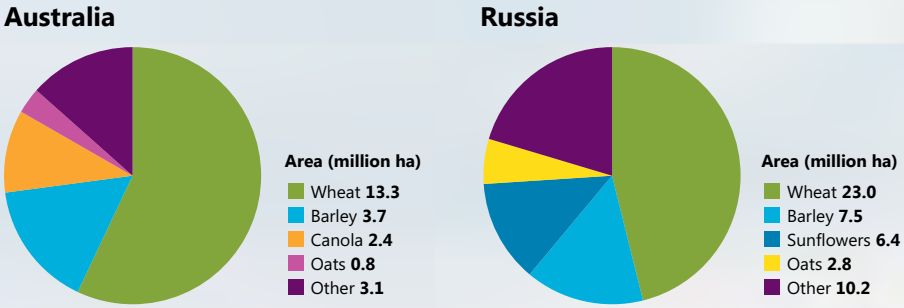
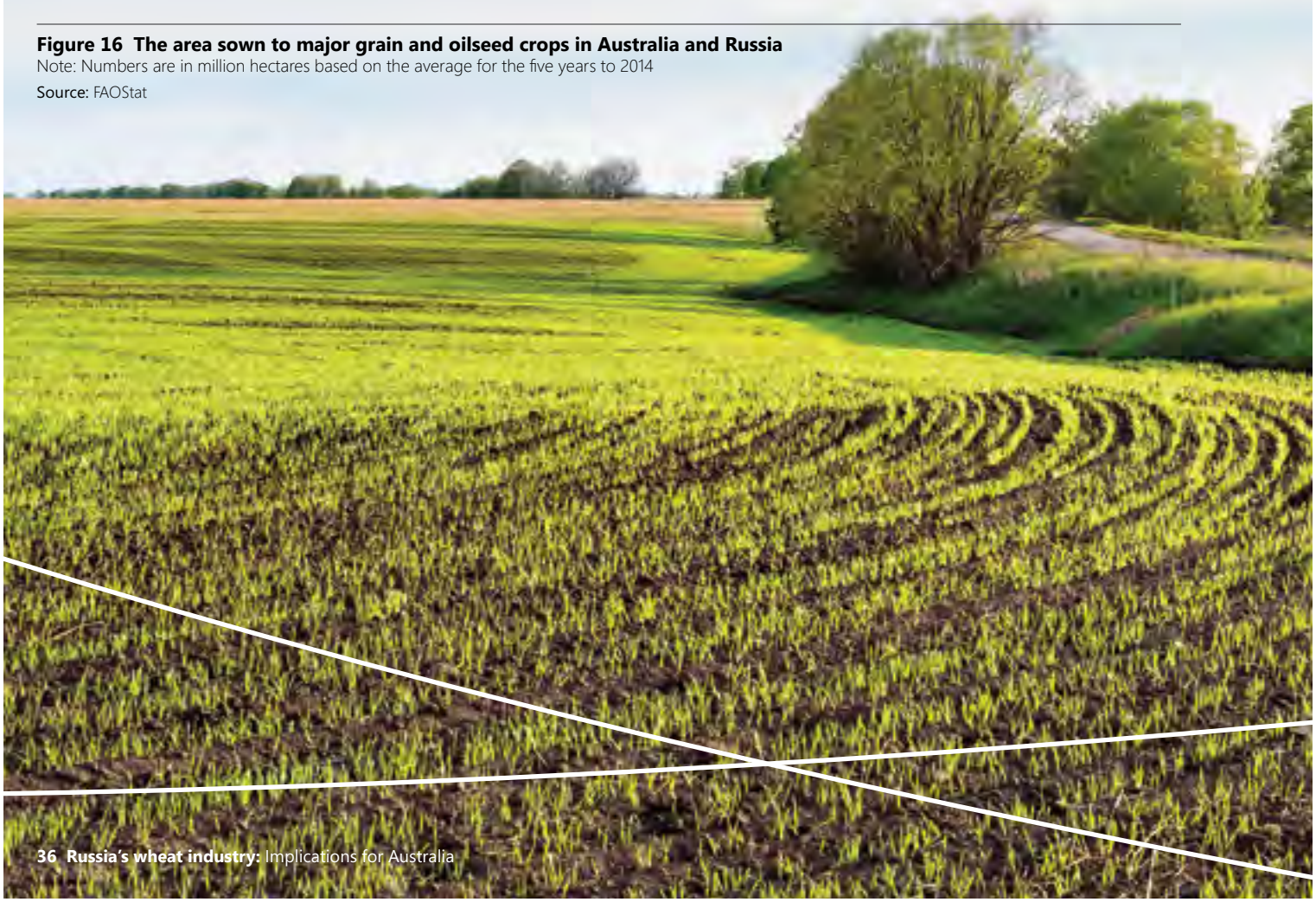


Figure 16 The area sown to major grain and oilseed crops in Australia and Russia
Note: Numbers are in million hectares based on the average for the five years to 2014
Source: FAOStat



Canola is Australia's most important oilseed crop and third-most widely grown crop overall. Over the five years to 2014 canola occupied about 10 per cent of the cropped area in Australia (2.4m ha) with sunflowers a minor crop, grown on less than one per cent of the total cropped area in Australia.

Of all major wheat-exporting countries in the world, Russia currently shows the greatest similarity to Australia in terms of the major crops grown and the proportional land allocation to each (except for sunflowers substituting for canola as the major oilseed crop grown in Russia). The situation, however, has been evolving rapidly both in terms of the total area and the mix of crops sown.

Under various Soviet agricultural programs, such as Khrushchev's *Virgin Lands* program during the 1960s, new areas of agricultural production, such as the Siberian District, were opened up, substantially increasing the total area of land dedicated to agriculture. This approach proved unsustainable and the total cropping area in the Russia started to decline from the end of the 1970s (Nefedova, 2011). This decline accelerated after the collapse of the Soviet Union through the 1990s, with the total area sown to grain and oilseed crops reaching a low point of about 42m ha during 1998. Since this date, the area has steadily increased by about 430,000ha per year to reach 54m ha in 2014 (Figure 17). The story has not been simply a recovery of the cropping areas previously abandoned, but a reorientation of cropping to the western and southern areas with a stronger export focus.

As of 1 December 2015, the unused arable land area was 19.7m ha, of which 1.8m ha had not been used for two years; 8.6m ha had not been used for between two to 10 years; and 9.3m ha had not been used for more than a decade.

Production of grains traditionally used to supply the domestic animal industries has not recovered to previous levels, while the area sown to export-orientated crops has increased substantially (Figure 17). During 2014 barley remained at about 50 per cent of the area sown in 1998. Similarly, oats remained at about 30 per cent and rye at 25 per cent of their previous areas. In contrast, the area sown to sunflowers has more than doubled; the area sown to corn and soybeans trebled, while the canola area has increased more than five-fold.

The regions closest to the export ports on the Black Sea have tended to be where most of the growth in the area of these crops has occurred, particularly for wheat (Table 5).

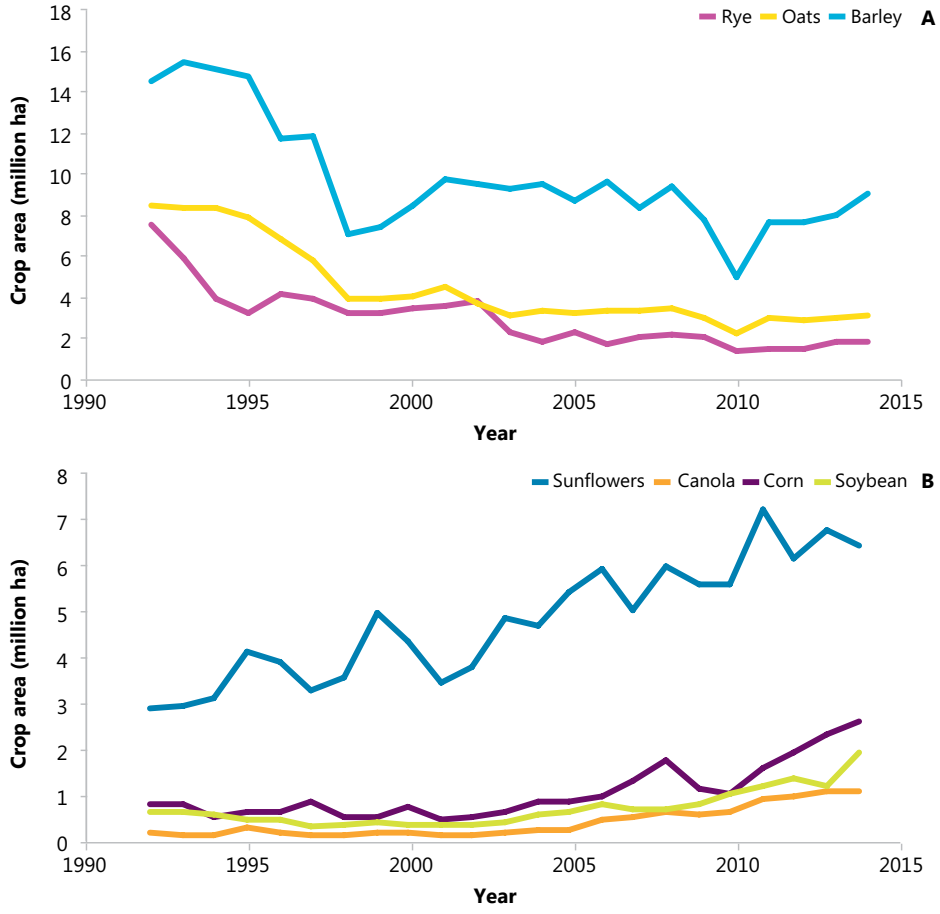


Figure 17 Area sown to traditional feed grains (A) or oilseeds and corn (B) in Russia (1992–2014)

Source: FAOStat

Table 5 Change in the area of grain and oilseed crops in the major cropping districts of Russia (1998–2014)

District	Wheat ('000ha)	Barley, rye and, oats ('000ha)	Corn, sunflowers, soybeans, and canola ('000ha)	Total ('000ha)
Central	326	-1937	2280	669
Southern	2536	-1076	1012	2473
Volga	-2649	-2150	2148	-2652
Ural	-122	-304	160	-266
Siberian	-1112	8	616	-488

Source: Rosstat

Furthermore, expansion of the sunflower, corn, soybean and canola areas have not come at the expense of the wheat area, except possibly in the Siberian District, which is furthest from the Black Sea export ports.

There has also been a steady increase in the area sown to winter wheat, compared with the decline in the area sown to spring wheat (see Figure 18). This is indicative of an expansion of wheat production in the milder southern and western parts of Russia more conducive to winter wheat production, closest to export ports. Most of the spring wheat areas are further north and east and a longer distance from export ports (Figure 19). Cropping in these areas has remained stagnant or continued to decline (Table 5). These changes are consistent with the emergence of agroholdings with a strong financial accountability and profit orientation. Managers of these companies are looking to produce higher yielding and exportable crops wherever the soils, climate and economics allow.

Productivity

All major grain crops in Russia have enjoyed upwards trajectories in their yields since the early 2000s. Corn yields in particular have enjoyed rapid increases. This is generally true for all major cropping districts, but increases have been particularly strong in the Southern and Central districts, which have been driving exports (Table 6). Averaged across all districts, since 2000 the annual rate of increase in wheat yields has been about 1.6 per cent, which was lower than for Canada and Ukraine (about three per cent annually) but higher than for Australia or the USA (about one per cent annually). The rate of increase in winter wheat yields across the exporting central and southern districts have been similar to both Ukraine and Canada.

Given the relatively rapid increases in wheat yields in Russia (Figure 20) and the increased area sown to higher-yielding winter wheat in the Southern and Central districts, total wheat production in Russia has almost doubled from 30mmt in 2000 to about 60mmt in 2014 (Figure 21). Similarly, production of sunflower seed has more than doubled and corn production has increased seven-fold during the same period.

It is worth nothing the production of these crops (wheat and sunflower seed) started from low levels and their combined production currently amounts to less than 20 per cent of total grain production (~20mmt).

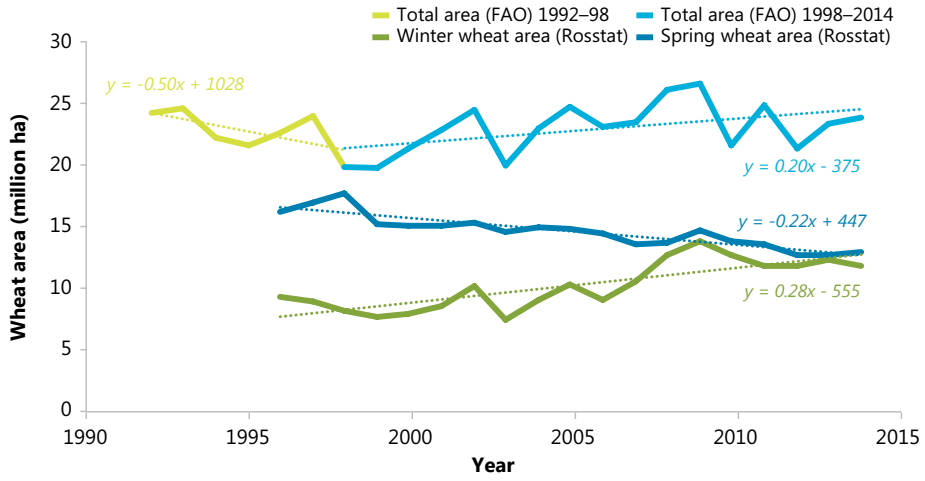


Figure 18 Total area sown to wheat in Russia (1992–2014) and area sown to either winter or spring wheat (1998–2014)

Sources: FAOStat and Rosstat

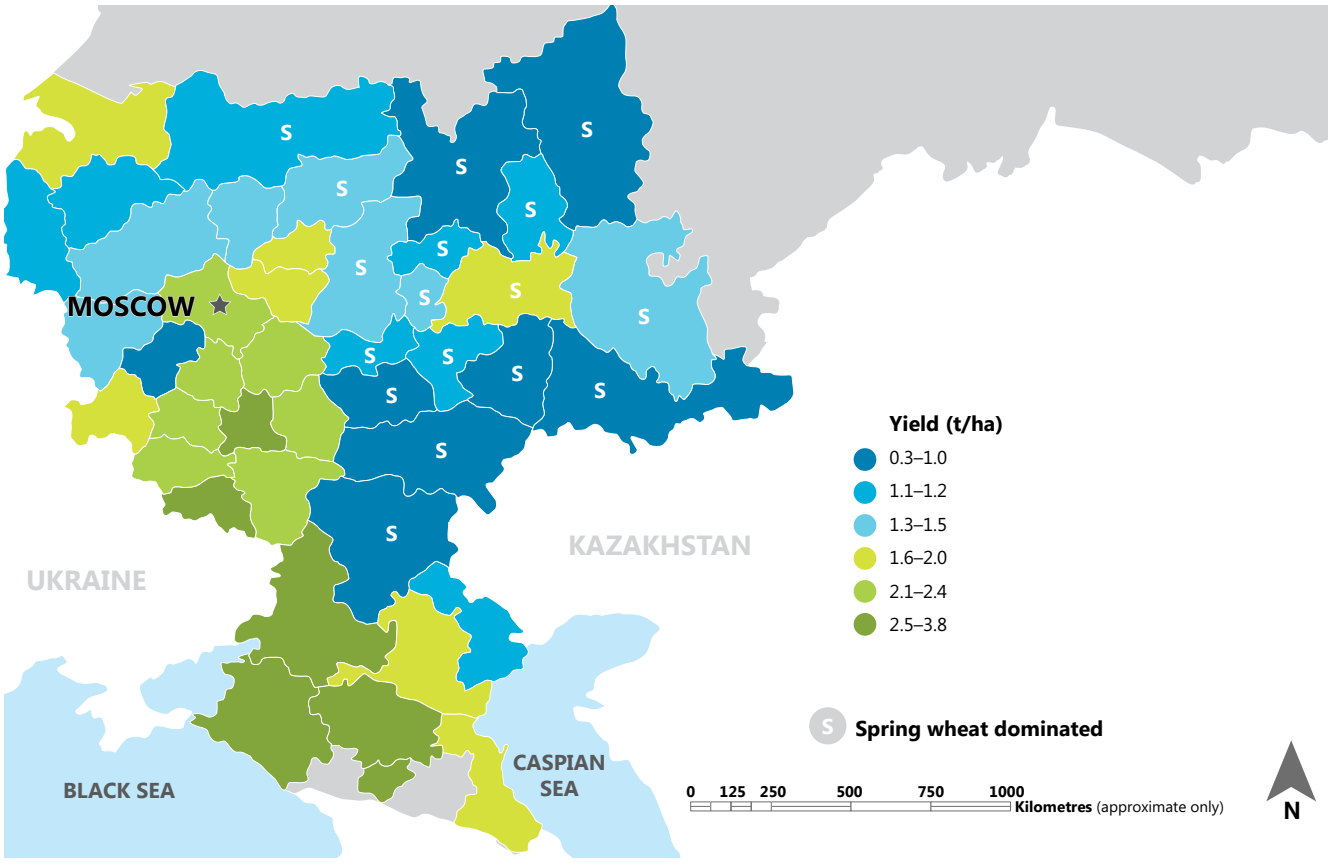


Figure 19 Average wheat yield and location of winter and spring wheat production across the main grain export regions of Russia

Source: Adapted from Schierhorn *et al* 2014: data source Rosstat

Table 6 Average yield and average annual increase in yield of major crops in Russia

	Winter wheat	Spring wheat	Winter barley	Spring barley	Sunflowers	Corn
District	**Average yield 2010–14(t/ha)**					
Central	2.9	2.1	2.1	2.5	1.8	4.6
Southern	3.3	1.3	4.2	1.7	1.5	4.1
Volga	1.7	1.3	na*	1.6	1.0	2.6
Ural	1.7	1.4	na	1.6	0.8	na
Siberia	1.9	1.4	na	1.6	1.6	1.8
District	**Average annual increase in yield 1996–2014(%)**					
Central	3.2	2.6	2.2	3.3	5.6	6.7
Southern	3.2	1.8	3.7	2.4	4.1	5.6
Volga	1.4	0.5	na	0.9	4.1	0.9#
Ural	1.0#	0.7#	na	1.6	4.1	na
Siberia	2.6	0.6	na	0.4	3.0	4.8

* insufficient data available. # estimates are from 1998–2014

Source: Rosstat

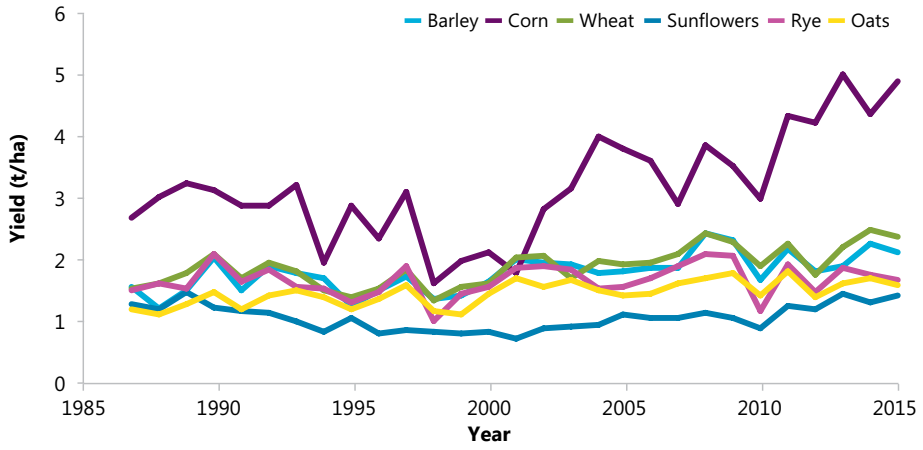


Figure 20 Change in yields of main grain crops in Russia (1987–2015)
Source: FAOStat

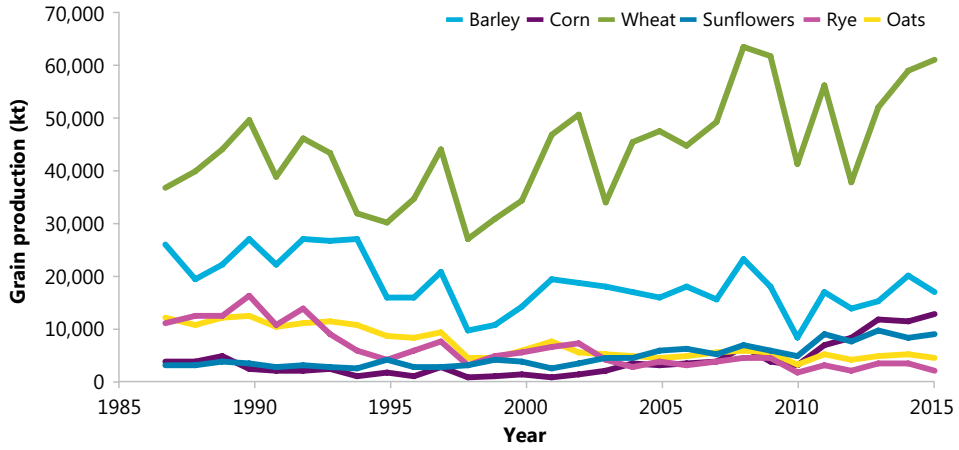


Figure 21 Total production of main grain crops in Russia (1987–2015)
Source: FAOStat

Understandably, the production of barley, rye and oats has stagnated or declined because of the shrinking areas sown to these crops, despite the continued increases in their per hectare yields.

Variation in wheat production in Russia is relatively high and somewhat similar to that in Australia. The coefficient of variation (CV) of detrended wheat yields in Australia from 2000 to 2014 was 25 per cent (FAOstat); this compares with 23 per cent for the Southern and Central districts of Russia during the same period (Rossat). When all grain-producing regions of Russia are included, the CV of detrended wheat yields decreases to 19 per cent (FAOStat).

Schierhorn *et al* (2014) modelled potential rainfed wheat yield in European Russia from 1995 to 2006. Their estimates indicate current average yields are between 1.5–2.1t/ha, or 44–52 per cent lower than the yield potential under rainfed conditions. They also note that recurring droughts cause large fluctuations in annual yield potentials.

Climate change

As in Australia, climate change has, and will continue to have, significant impacts on cropping in Russia. Unlike, Australia however, the common view among Russians is that climate change is beneficial for agriculture (Dronin and Kirilenko, 2011). Given the size and diversity of Russian environments, the reality is that climate change will continue to have regionally specific impacts. Oxfam (2012) quotes several Russian sources, indicating both positive and negative consequences of climate change on crop production since 1975. This includes lower minimum temperatures in some regions, variable effects on rainfall and a moderation in Russia's continental climate. In

general, they conclude that the production environment has become more stable with higher minimum temperatures, reducing the risk of winter crop kill in high-risk production environments. An increase of about 5–15 frost-free days has also allowed broader cultivation of longer-season varieties with higher yield potential, and improved harvest conditions.

Projected changes in climate out to 2050 also point to a potential expansion of the area suitable for cropping in Russia. Dronin and Kirilenko (2011) quote the Interagency Commission of the Russian Federation on Climate Change Problems (2006), where they state that higher temperatures will shift northwards the area suitable for intensive agriculture in Russia by as much as 600km. Predicted expansion of the cropping areas, however, does not take into account the significant capital cost associated with establishing new farms, as well as the concomitant need to establish storage handling and transport infrastructure.

Coupled with an improved growing environment in the northern agricultural areas is a more challenging production environment in the south. Kiselev *et al* (2013) used four general circulation models (GCM) to examine the impact of climate change on Russia's food security. They indicated that, in general, there is likely to be an increase in rain across Russia, although in the southern grain-growing areas the models predict a relatively small chance of either an increase or decrease in rainfall. However, they do indicate an increase in the frequency of droughts by 2050. Combined with increases in temperature and changes in soil and nutrient availability they predict climate change will impact negatively on wheat yields, in the southern regions but positively in the Volga, Ural and Siberian districts. Similarly, Alcamo *et al* (2007) suggest that climate change projections point to increases in the drought frequency and more frequent production shortfalls in the Southern and Central districts of Russia where much of Russia's wheat is grown and exported.

Importantly, however, these predictions do not account for adaptations to climate change, such as new varieties and planting methods, that have been shown in Australia to reduce adverse impacts. Dronin and Kirilenko (2011) list adaptive strategies available to Russian agriculture, both in terms of improved technical efficiency as well as policy and market reform, that will steer investment to the most profitable and productive grain areas. These reforms are likely to greatly mitigate the negative effects of climate change in Russia while enhancing positive outcomes.

An increase of about 5–15 frost-free days has also allowed broader cultivation of longer-season varieties with higher yield potentials and improved harvest conditions.

Wheat supply chain

Overview

The general characteristics of Russia's export grain supply are shown in Figure 22 and are contrasted against the supply chains in Australia and Ukraine. The key steps in each country's supply chain are similar, however there are some important differences in the magnitudes of crop volumes, crop portfolios, transport modal shares and storage capabilities.

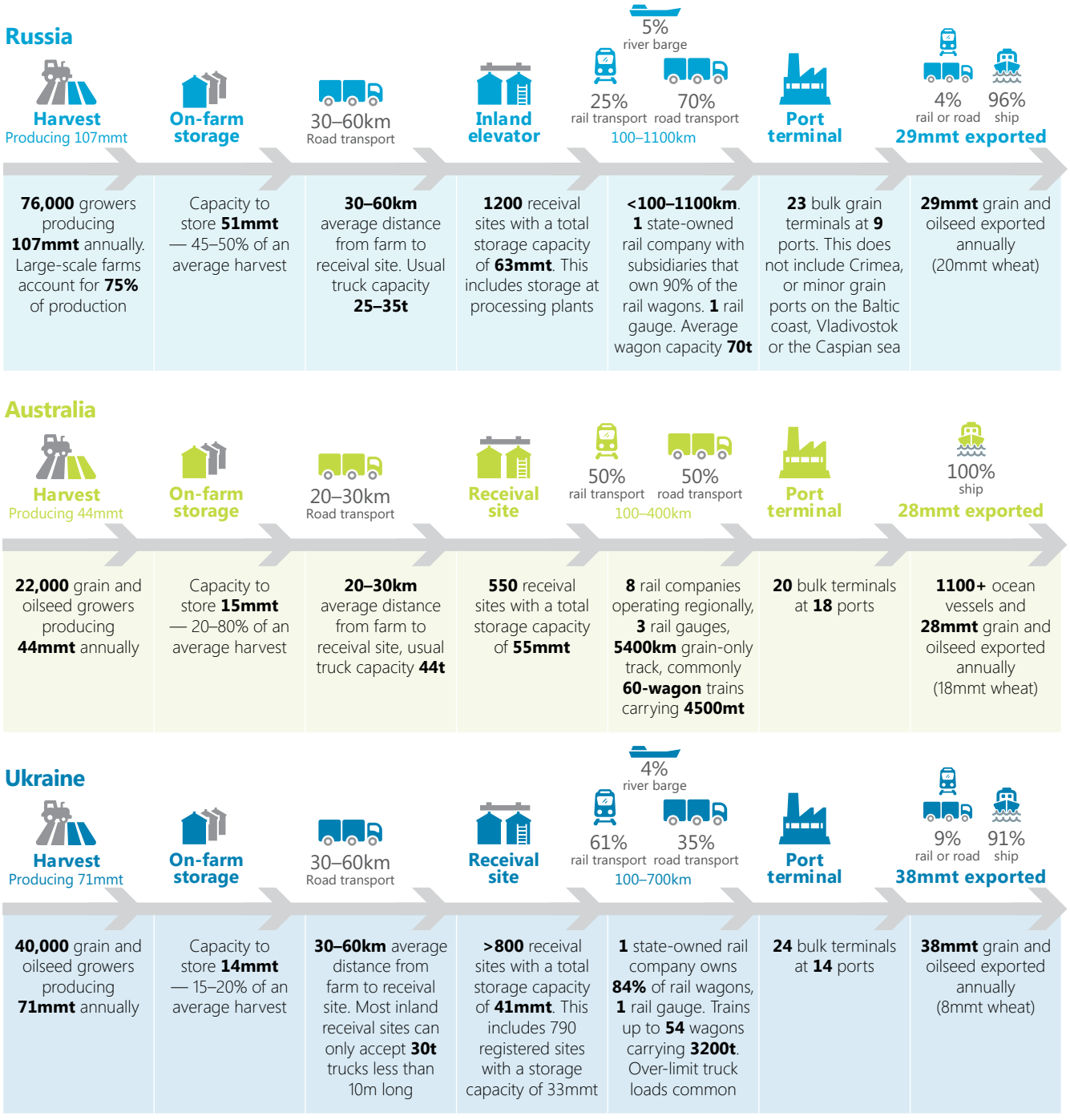


Figure 22 Comparison of the export grain supply chains of Russia, Ukraine and Australia

Source: AEGIC

Each country has a similar number of port terminals and Russia and Australia currently export a similar volume of grain, with wheat forming a similar dominant share of grain exports. However, Ukraine exports a larger volume of grain (38mmt) of which wheat forms a much smaller share of its grain exports (only 8mmt).

Russia transports a much larger proportion of its grain exports by truck (70 per cent) compared with Australia (50 per cent) and Ukraine (35 per cent). Russia has many more grain receival sites (1200 elevators) compared with Australia (~550) and Ukraine (>800). However, grain storage in Russia is only 63mmt compared with 55mmt in Australia and 41mmt in Ukraine. Regarding on-farm storage, Russia has 51mmt compared with 14mmt in Australia and 15mmt in Ukraine. Lastly, grain output per farm in Australia on average is greater than occurs in Russia or Ukraine, principally due to a larger average farm size in Australia.

Total costs

Cost

The total cost of producing a tonne of grain, delivering it to port and loading the grain onto a ship is about AU$124 less in Russia than in Australia (Table 7). Russian wheat is cheaper to move to an export position, mostly due to the rouble being weaker relative to the AUD when both are compared against the USD. The better quality of on-farm and up-country storage and handling infrastructure in Australia adds to the expense of its supply chain but potentially provides greater control over the specifications and quality of the grain received and stored.

In Australia, the cost of production forms 72 per cent of the total supply chain cost compared to 68 per cent in Russia, with the supply chain cost component being 28 per cent of the total cost in Australia and 32 per cent in Russia (export supply chains only).

Efficiency

The Russian supply chain experiences a significant peak load problem, where, following the harvest of grain from July through to September, the volume of grain moving to an exportable position doubles compared with the January to June period. While Australia must also manage peak load, the volatility of demand for supply chain services through the year is not as significant (Figure 23).

The huge increase in Russian export volumes since 2009, when combined with the peak load problem, has triggered significant investment in the Russian supply chain, especially in port infrastructure. Grain port terminal capacity needs to handle the strong growth in export volumes, and provide excess capacity to accommodate the three-month period when the demand for port services is nearly double that required in other months.

In Australia there has also been significant investment in port infrastructure to facilitate execution of grain orders in a post-deregulation environment. However, unlike the situation in Russia, Australia now has idle capacity at some east coast ports. Besides investments at port, in both countries additional investment is occurring in new or upgraded up-country grain storage and handling facilities, including additional on-farm storage.

Farm costs of wheat production

Estimating a nation's cost of wheat production is extremely difficult — sometimes due to a paucity of relevant data. Moreover, a broad range of farm cost structures usually exists, from high-cost to low-cost production systems. Each country's wheat crops are grown in different climatic conditions, on different soil types, in different rotations, on different farm sizes, with differing technologies, under different weed and

Table 7 Total supply chain costs in Russia and Australia

	Russia		Australia	
	(AU$/t)	(%)	(AU$/t)	(%)
Cartage to bin	3.46	6*	7.80	9*
Storage	5.13	9*	9.00	11*
Upcountry handling	9.21	17*	18.40	22*
Transport to port	15.52	28*	26.70	32*
Handling at port	22.19	40*	13.10	15*
Shipping	0.19	0*	6.80	8*
Levies	0.10	0*	2.80	3*
Supply chain cost	55.79	32^	84.60	28^
Production cost (wheat)	121.16	68^	216.15	72^
Total cost (AU$/t)	176.95		300.75	

* percentage of supply chain cost. ^ percentage of total cost (supply chain + production cost).

Source: AEGIC

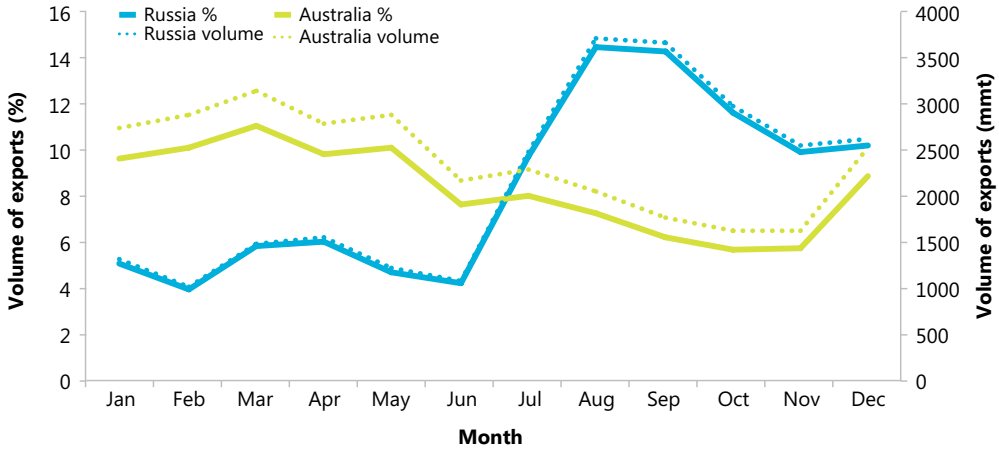


Figure 23 Comparison of monthly export volumes and percentage of total grain exports per month in Russia and Australia

Source: State customs data, ABS

pest burdens. Hence, production costings for each country, or even for a region within a country, are best interpreted as being broadly indicative of key or typical differences.

The cost of production per tonne for Russian wheat is roughly AU$95/t less than the cost of production for Australian wheat (Table 8). Table 8 presents only variable and fixed operating costs (including a land lease cost) and not capital costs, which would reflect differences in ownership structures. There is much diversity in ownership structures and the means of financing the farming operations. While the costs on a per hectare basis are less in Russia, wheat yields are also higher on average in Russia than in Australia. The costs of production, and the difference in the cost allocation, is partly a function of the difference in tillage systems, where the Russian system is reliant on full-cut tillage, whereas Australian growers have moved towards minimum or no-till systems. The cost of machinery in Russia is much higher than in Australia, reflecting the different tillage systems and the relatively higher cost (in local currency) of imported machinery. However, the greater use of tillage in Russian crop production results in the need for, and cost of, chemicals for weed control in Russia being much less than in Australia.

Within the export-grain-producing regions of Russia, generally the cost per hectare to produce winter wheat is higher than

Table 8 Estimated costs of export wheat production per hectare in Russia and Australia

	Russia			Australia
	Spring wheat	Winter wheat	Weighted average*	Weighted average
Yield (t/ha)	2.84	3.28	3.25	1.82
Area % (composition of exports)	5%	95%		
Production costs (AU$/ha)				
Seed	27	43	43	27
Fertiliser	80	198	192	90
Chemicals	29	72	70	110
Machinery (maintenance/fuel)	49	51	51	32
Labour	23	17	17	11
Variable costs	208	381	373	270
Land	9	5	5	80
Other fixed costs	18	16	16	43
Total costs (AU$/ha)	235	403	394	393
Total costs (AU$/t)	83	123	121	216

* The weighted average assumes that 95% of the exported wheat is winter wheat.

Source: Boersch (2013), Rylko (2015), World Bank 2016, USDA 2016, US Federal Reserve 2016, Planfarm/Bankwest (2015), GRDC (2015), Agribenchmark (2015), Other Industry Sources.

spring wheat (though winter wheat achieves a higher yield and so its production cost per tonne is less). With these higher yields and lower costs of production per tonne in Russia, there is a shift towards winter wheat, with its relative returns being greater than spring wheat, despite spring wheat often being higher in protein and thereby attracting a price premium. Moreover, if there is a crop failure with winter wheat, the opportunity exists to oversow with a spring crop. Rylko (2015) indicated there was a strong trend to increase the area sown to winter wheat. This trend is expected to continue, although the resultant emerging price premium for higher-protein wheat (up to AU$93/t during 2014), eventually may weaken the relative margin for winter wheat.

To varying degrees, land is tradeable in Russia, following the 2003 decree of the *Agricultural Land Market Act*. This Act was followed in 2008 by the State Real Estate Cadastre, then the 2010 update of the *Agricultural Land Market Act*, which was designed to stimulate land consolidation. The greater certainty provided by ownership rights also afforded farmers the opportunity to borrow capital to finance farm operations. However, despite these policy reforms, as pointed out by Sagaydak and Sagaydak (2016) contradictions and a lack of legal clarity still surround some aspects of land purchases in Russia. These researchers comment that;

> *"... outside investors, as well as other customers, are not able to get reliable information about the value of agricultural land plots and participate as educated and well-informed market agents (buyers or sellers) in agricultural land market transactions ..." (p.10).*

Moreover, land values are still significantly lower than land of similar quality in Europe, as indicated in Rylko *et al* (2015).

> *"As to the land cost, due to some historical issues, including privatisation peculiarities, it remains relatively inexpensive relative to potential operators' profits. As an example, land lease prices of high quality land with typical yield of 4.0t/ha for small grains and 7.0t/ha of corn in Central Black Soil are still below $50/ha." (Rylko* et al*, 2015)*

Agribenchmark (2014) indicates the lease rate in relation to the return to land in Russia is approximately eight per cent, as opposed to German farms that pay up to 50–60 per cent of the return to land as a lease rate. In Australia, the lease rate is close to eight per cent of the purchase value of the land on an annual basis.

Möllman (2015) and Zimmer (2015) report the costs and returns of wheat production on case study farms in various wheat-growing countries (see Figure 24). The farms in Russia and Ukraine are identified as particularly low-cost suppliers of wheat and their profit margins per tonne of wheat produced are, together with the Poland example, among the highest for all farms examined. Understandably, these findings need to be treated with caution as they represent a small sample of wheat farms and are only for a single production year. Nonetheless, anecdotally they are consistent with the broadly observed trade trends, whereby price-sensitive markets display a preference for grain produced in Russia and Ukraine.

What is not apparent in Figure 24 is the variance in the cost of production within each grain-producing region. The cost per tonne is heavily influenced by the yield, so where there is variability in yield, there is also variability in the cost per tonne of production. Regarding variability, the CV in total Australian wheat yields is about 23 per cent, and the CV of Russian wheat yields in the export regions is also around 20 per cent. One inference is that Australian wheat growers with their higher costs of production, especially in low-yielding years, will incur losses in those years as the wheat they sell to export markets attracts a price mostly determined by wheat available from cheaper origins.

Rabobank (2013) also examined farm-gate variable costs of wheat production in several wheat-producing nations and listed those costs for Australia, the USA, Canada, Ukraine, France and Argentina per tonne as US$146, US$140, US$142, US$136, US$143 and US$138 respectively. In short, among those countries Australia displayed the highest variable costs of production.

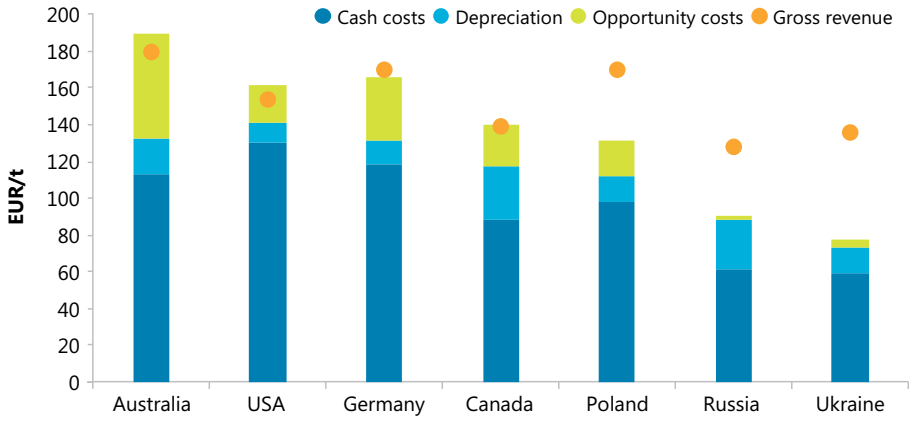


Figure 24 Income and production costs on wheat farms in different countries

Source: Based on data and charts in Möllman (2015)

Grain storage and elevators

The volume of grain storage capacity in Russia during 2015 was 115mmt, of which 44 per cent (50.8mmt) was on-farm storage, 42 per cent (479mmt) was owned by grain trading and handling businesses and 14 per cent (16.3mmt) was part of grain processing businesses. Since the early 2000s most of the additional storage was constructed by grain processors and grain exporters as part of port terminal expansions. Since 2010, the construction of new storage has outpaced the retirement of obsolete storage by the ratio of 1.5:1, with new storage being constructed mostly in the compound feed industry. Overall, there is now about 10 per cent more storage than grain produced. The largest share of storage capacity remains as on-farm storage, most of which was constructed as floor-based storage during the 1950s through to the 1970s and the quality of this storage has deteriorated, leading to damaged grain and a reduction in grain quality. About 70 per cent of on-farm storages are in some way deficient, resulting in crop damage. The effect of this poor storage will also extend to reduced germination rates in seed stored for the next year's crop production.

The cost of elevation and upcountry handling in Russia is less than in the Australian system (Table 9). While this is mostly due to the limited capital being invested in the system, with most elevators being fully depreciated, there are network issues that need to be addressed if exports are to continue increasing at the current rate.

Elevators in Russia are often managed and operated locally, and the network has not yet undergone the same level of ownership consolidation and network rationalisation that has occurred in Canada or eastern Australia. This process is underway, through investment in centralised hubs, or elevator complexes, either by large Russian agroholdings or via smaller-scale foreign investment. Much of the investment from within Russia is coming from vertically-integrated companies with an interest in feed grain. These firms construct grain handling and storage facilities as part of their feed mill complex. This investment may provide some scope for reducing elevator charges through greater throughput and less spoilage or damage to stored grain. The current cost of grain storage and handling in Russia is already below that of Australia, mostly due to Russia's limited need for airtight storage to facilitate fumigation, as the winter in most grain-producing regions is cold enough to kill most insect pests.

The structure of Russia's grain handling network, where there are many smaller elevator facilities, does increase the cost of transport through inefficiencies in loading. The smaller elevators are often incapable of loading unit trains of one type of grain. However, while the storage and handling imposes a restriction on the ability to service unit trains, the ability to load unit trains is also compromised through compliance requirements.

Elevator to market or port

Mode of transport

Without navigable rivers to utilise barges, rail transport is the only option for long-haul transport of grain. Nonetheless, the Ministry of Agriculture is encouraging greater use of the limited river network for grain transport. This infrastructure, however, is degraded and the goal of increased river barge transport seems unlikely to be achieved. The expected growth in grain volumes transported by rail is 3.2 per cent per annum, and the Ministry hopes river barge grain volumes will increase at 3.6 per cent per year, but off a much lower base volume.

The overland rail routes to port for Russian grain are some of the longest rail journeys for exported grain in the world. Grain from the production regions in western Siberia must travel roughly 3500km to reach the Black Sea Ports, or 6000km to the far eastern ports such as Vladivostok. Given the cost

Table 9 A comparison of the cost of storage and handling in Russia and Australia

	Russia		Australia	
Process	AU$/t	% section cost	AU$/t	% section cost
Handling (receival fee)	2.0		10.10	43
Drying	1.3		<0.10	
Storage*	5.1		9.00	38
Elevator outturn	5.5		6.40	27
Other charges	0.40		1.90	8
Cartage	3.5	18	7.80	33
Storage	5.1	29	9.00	38
Handling	9.2	53	18.40	78
Total (cartage, storage and handling)	17.8		35.2	

* Storage in Russia is, on average, for three months vs five months in Australia. It includes costs for on-farm and warehouse storage.

Source: Boersh (2013), IKAR (2016), Graincorp (2016), CBH (2016), Viterra (2016)

of rail freight and its susceptibility to weather events and disruption, and given the length of the rail journey, it is no surprise Vladivostok has not become one of the main export ports for grain.

For haulage distances shorter than 500km, road transport is mostly more cost-effective. Given that nearly 85 per cent of Russia's exported wheat is grown in the Southern District, with much of the remainder of the exported grain grown in the adjacent northern Central District, much of the exported wheat is trucked to port. A comparison of the costs over distance is presented in Table 10.

Rail and road networks

Russia's rail network is the third longest of any country, exceeded only by networks in the USA and China. With around 85,000km of main line (Figure 25) and more than a trillion tonne kilometres of rail haulage per year, rail is the backbone of the country's transport. However, within the region where most of the grain is grown for export, rail is increasingly second-place to road transport, which is more cost effective and more flexible. This preference for road transport partially results from the high cost imposed by the regulatory burden of using rail. Additionally, the rail wagons are aging, with many being retired. Hence the cost of utilising the remaining wagons is likely to increase, due to potential wagon shortages during peak transport periods. Reforms in the rail sector may allow some of the aging wagons to be replaced, though it is uncertain if the rate of replacement can keep pace with the retirement rate.

While reforms are underway in the Russian rail system, they are unlikely to encompass the raft of changes required in the short term to keep pace with the growing demand for grain export. This will push more tonnes of grain on to the road network, which unlike the rail system, does not have the same funding mechanism to facilitate maintenance of its infrastructure. Government revenues, and hence expenditure, rely on the energy sector, but with currently low energy prices, government funding for road repairs is not expected to meet requirements. This underinvestment will affect the ease and cost of bringing grain to port. Nonetheless, the road network provides multiple paths for delivering grain to port, facilitating flexibility and executing contracts.

Rail operators

The Joint Stock Russian Railways company (RZhD) owns nearly all of the 85,000km of main line used in Russia, with the Russian government being the sole shareholder in the company. The segments not owned by RZhD are privately owned and operated.

Table 10 A comparison of grain transport costs in Russia and Australia

	Russia			Australia
	Rail transport	Road transport	Weighted average	Road and rail transport
Modal share for wheat (%)	36	64		100
Average distance (km)	400	250	304	267.8
Cost per net tonne kilometre (AU$/ntk)	0.04	0.038		0.08
Fixed cost component	6.00	2.31		4.4
AU$/t for				
100km	10.0	6.1		12.40
200km	14.0	10.0		20.40
300km	18.0	13.8		28.40
400km	22.0	17.6		36.40
500km	26.0	21.4		44.40
600km	30.0	25.3		n/a
700km	34.0	29.1		n/a
800km	38.0	32.9		n/a
Total costs (AU$/t)	22.0	11.9	15.5	26.70

Source: Rosstat, Consultant data, Graincorp (2016), Viterra (2016), CBH (2016)

Right: The Joint Stock Russian Railways company (RZhD) owns nearly all of the 85,000km of main line used in Russia.
Source: Shutterstock

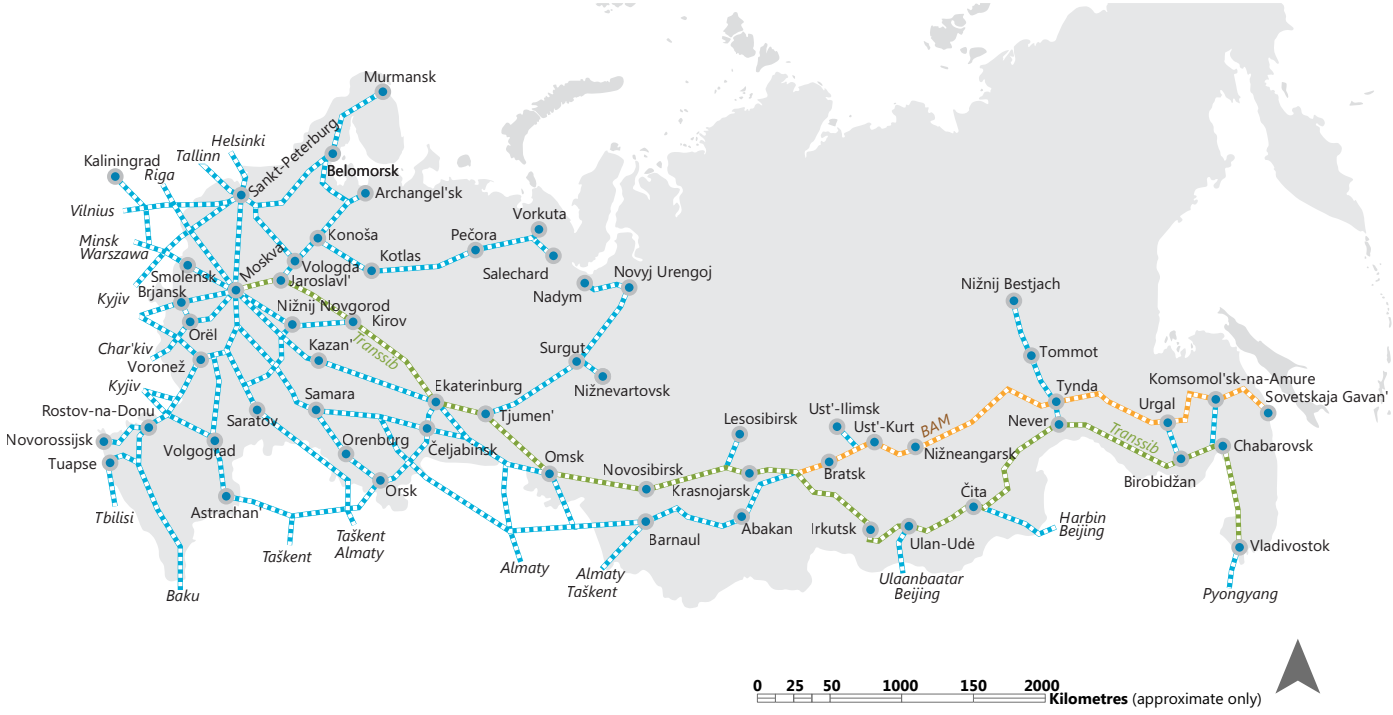


Figure 25 Main line rail network in Russia

Source: Wikipedia

RZhD is a monolithic cornerstone of the Russian economy, employing upwards of 830,000 people across the country, responsible for nearly four per cent of GDP and turning over more than 2.9 trillion t/km of freight per year, across an average distance of 1700km. While the under-rail asset is owned and operated by RZhD, there is a more competitive market in above-rail rolling stock. RZhD stills owns a significant percentage of the rolling stock through subsidiaries, but private companies have entered this market. These private companies are investing in, or purchasing, the subsidiary companies to access rolling stock, as well as investing in new rolling stock to upgrade the many outdated ex-RZhD wagons.

While the ownership of the wagons is becoming privatised, the ownership of the locomotives is still in the hands of the RZhD who own around 20,000 locomotive units, compared with around 300 in private hands. The locomotives in private hands are often confined to private railways, and as such do not compete in the freight market.

Rail policy

While the RZhD is an effective monopoly, it is subject to regulation through the Federal Anti-Monopoly Service to ensure it does not operate as a pure monopoly, with the ability to collect monopoly rents. Policy to restrict this behaviour includes a bounded pricing mechanism that RZhD must abide by, where it is restricted by upper and lower limits on the tariff charged to customers. The upper limit restricts price gouging by the railways that would limit profitability of the industry using the freight service. The lower limit restricts the capacity of RZhD to undermine any competitors entering the market by lowering access prices. While the lower limit on the tariff is designed to reduce the barrier to entry, no other provider has successfully entered the market to provide under-rail services.

The differential tariffs mean substantial cross subsidisation between industries. The coal industry for instance has a tariff where the operational cost is approximately four times that for grain, while passenger transport has the lowest tariff. This cross subsidisation extends to the contribution to infrastructure. Tariffs comprise three parts: an access or infrastructure charge, an operational charge and a wagon rental. The infrastructure charge is a fixed proportion of the operational charge. This means freight types with a higher operational cost also contribute more to the infrastructure component. Where private operators use their own wagons, they are not charged the infrastructure component of the tariff.

While there is cross subsidisation between industries, there are also differential rates within an industry, where shorter haulage tasks are levied at a higher rate than longer journeys. In this way, the shorter haulage tasks subsidise the longer routes. Despite the level of cross subsidisation, the infrastructure and access charges are set at a rate that allows near full cost recovery for the rail infrastructure.

The heavy reliance on rail and the funding model for railway maintenance have meant the condition of Russian rail infrastructure is generally fair. The wagon fleet is being replaced mostly through private funding, while the removal of this source of revenue (the wagon rental component of the tariff) does not impinge on the collection of revenue for maintaining the rail itself.

For export grain, much of the rail transport task is short haul compared with the longer routes. The average haulage task in Russia is 1700km, yet much of the exported grain comes from regions within 500km of a port.

Restructure

Although there is some discussion regarding restructure of the rail monopoly, additional reform of the rail system in the near future is unlikely. The sector has endured reform since 2003, resulting in the privatisation of much of the rolling stock (locomotives excepted), although reform has not extended to under-rail infrastructure. However, private operators have complained of preferential treatment by RZhD for its subsidiaries. Further reform to formally split these RZhD subsidiaries away from RZhD management of the under-rail service would bring a new set of problems to address. Firstly, given the length of the railway system and the size of the country, splitting the RZhD would in many cases only result in the creation of multiple localised monopolies. On the Trans-Siberian route this structural change could introduce a hold-up problem for freight crossing multiple sectors.

Rail operations

The total volume of rail freight across all industries dwarfs the task of shifting grain via rail (Figure 26). Grain on rail forms less than five per cent of the rail freight task. By contrast, in Australia, rail freight in some regions is almost solely beholden to the grains industry and the volatility in grain production. In Russia, the grain transported by rail does attract a lower tariff compared with other industries, though this is the extent of the preferential treatment extended to grain.

The current system for transporting grain by rail involves a high regulatory burden, through the need for certification. Each wagon of grain must receive documentation, with up to eight forms of documentation required before a shipment can proceed — as compared with trucking, which only requires one certificate (Sosland, 2012). To lessen this regulatory burden and facilitate grain handling, rail freight is transitioning towards utilising unit trains with one set of documents for 45 carriages. These certified trains are loaded within newly-constructed elevator complexes, which allow faster turnaround times and reduce costs.

Along with the simplification of documentation, there is a shift towards simpler contract specifications, with essential data including: prices, grain type and key quality parameters. This change to contract specifications will affect where and when the blending of grain takes place. While previously much of

Figure 26 Rail freight volume versus total grain production

Source: SCI Verkehr,(2014) *The railway market in Russia and the CIS: Facts, Figures, Players and Trends*

the blending occurred before loading the trains upcountry, this new system should see an increase in the level of blending at port, giving exporters the flexibility to blend for individual customer's requests.

Port operations and shipping

Ports in Russia have undergone a change in both ownership and scale. While traditionally owned by government, ports are rapidly privatising, with facilities being improved through private funding. While the berths generally remain in the hands of the government, the rest of the port is more often in private hands. Russian ports are currently more expensive to operate than the Australian equivalents, with the cost of receiving and handling grain being up to AU$2.30/t more expensive than in Australia (Table 11).

There is a mix of scale across Russia in terms of port scale and capacity, with Russia's larger ports having larger scale than in Australia, although there are smaller ports, especially in the Azov sea, which load smaller vessels than those typically used in Australia.

Port capacities

The ports on the Black Sea (Figure 27 and Table 12) are responsible for shipping most of the grain exported from Russia, with about 85 per cent of the export capacity located in this southern region.

The key Black Sea ports: Novorossiysk, Taman and Tuapse, are responsible for 50 per cent of the total export capacity, with shallow-water ports on the Black and Azov seas responsible for 35 per cent of the total export capacity. These smaller ports load the coaster-sized vessels (10,000t) that make their way through the Bospherous into the MENA markets.

The Azov ports also fill an important role in one of the most cost effective shipping solutions, through supplying coaster vessels to the Kerch/Port Kavkaz transshipment operations. The coaster vessels offload grain into larger vessels on deep water moorings, avoiding costly fobbing charges at port. The deep-water ports of Novorossiysk, Tuapse and the transhipment facilities off Taman, in the Kerch Strait are responsible for most of the export volume, especially into markets further than the MENA region. The major port of Novorossiysk has been refurbished since 2014, with annual

Table 11 A comparison of port handling costs in Russia and Australia

	Russia		Australia	
	Bulk (AU$/t)	% section cost	Bulk (AU$/t)	% section cost
Receipt of goods	N/A		1.50	8
Vessel loading	22.0		11.60	58
Vessel nomination/survey	N/A		6.10	31
Other	N/A		0.70	4
Port charges (pre-loading)	22.0	99	13.10	66
Port charges (post-loading)	0.19	1	6.80	34
Total (AU$/t)	22.19		19.90	

Source: Consultant data, www.rosmorport.com

Figure 27 Ports in the Black Sea

Source: www.mapofukraine.net

Table 12 Statistics for key Russian Black Sea ports

Indicator	NGP 2018	NGP 2015	NGT	KSK	GTCT	TCSP
Location (port)	Novorossiysk	Novorossiysk	Taman	Tuapse		
Total area (ha)	14.5	14.5	7.2	12.6	3.6	-
Grain receival capacity from:						
Railway (t/day)	14,500	10,350	12,560	6900	NA	7590
Trucks (t/day)	9800	9800	11,200	12,600	18,000	n/a
Grain trans-shipment capacity (kt/yr)	6500	3500	3500	3500	4000	2000
Productivity of conveyor (t/hr)	3600	1600	1600	1600	1500	1400
Ability to receive wagons without sorting routes	Yes	No	No	No	No	No
Total storage capacity in grain elevators ('000t)	250	140	120	115	192	98
Simultaneous storage of different crops (No. of crops)	8	4	3	3	6	3
Features of served vessels						
Maximum deadweight ('000t)	80	72	65	45	45	50
Maximum draft (m)	13.1	13.1	13.1	11.8	12.8	12.5
Maximum length (m)	240	229	229	225	230	230

Source: http://novoroskhp.ru/

capacity lifting from 11mmt to 18mmt through the addition of a new grain terminal. The new terminal's rated loading capacity is 3600t/hr, equivalent to the most efficient terminals in Australia.

Russian ports are generally well equipped to manage an increase in export volumes (Figure 28). Investments by Russian and foreign companies are increasing the export capabilities of the port sector significantly. Currently there are about 40mmt of shipping capacity through ports in the southern region. This is expected to increase to 60mmt by 2020. The 40mmt of available shipping capacity is currently in excess of requirements for even the best export season so far experienced in Russia (2015/16), when 31mmt of grain was exported.

While the total port capacity may currently match the volume exported, the distribution of demand for port services throughout the year is not smooth, with peak demand during August, September and October double the demand during May and June. The ports in the Azov sea are dysfunctional for much of winter, and the operational capacity of the Black sea ports from December to February is also limited through exposure to bad weather. The overall demand for loading capacity of around 5.4mmt per month translates into an annual capacity to load 65mmt of grain a year.

However, as the port constraints are lessening, moving grain into the ports is where grain flow is constricted. These transport corridors to port are the domain of either the state-owned rail company or federally-funded roads, so the scope for investment into the last mile to improve the logistics is limited, without government support.

Port ownership

Ownership of Russian port infrastructure is in a state of transition. Historically the ports were government-owned but most new investment is occurring through private Russian investors and international investors. For example, Russian agroholdings are realising the worth of owning export capacity. Foreign companies also want to gain a foothold in an increasingly important origin of grain.

Port to destination

Ports in Russia (Figure 28) can serve nearby markets in the MENA region, with the Azov Sea ports more suited to servicing Black Sea (Georgia, Azerbaijan) and nearby Mediterranean markets (Turkey, Cyprus, Israel, Greece, western coast of Italy and Egypt) than other markets (as they can only fill smaller vessels, or part fill larger vessels to be topped up in deep-water ports). Russia has access to deep-water ports in Novorossiysk, Tuapse, and an open sea 'port' of Taman, while the other deep-water port they currently have access to is near Sevastopol (and a smaller, old facility in Kerch), although there is no easy means to supply grain to this facility.

Shipping time and distance

Proximity to the MENA markets provides a significant advantage in shipping rates and time for Russian grain. The time to ship from Novorossiysk into Egypt is about 3.8 days compared with 25 days from Newcastle, Australia. A corollary is that Asian markets are significantly closer to Australian ports, with Indonesia only five days shipping from Kwinana, Australia compared with 20 days from Novorossiysk (Table 13). However, given the low cost of shipping in recent years, this distance does not currently translate into a significant cost advantage for Australian grain (see Table 14).

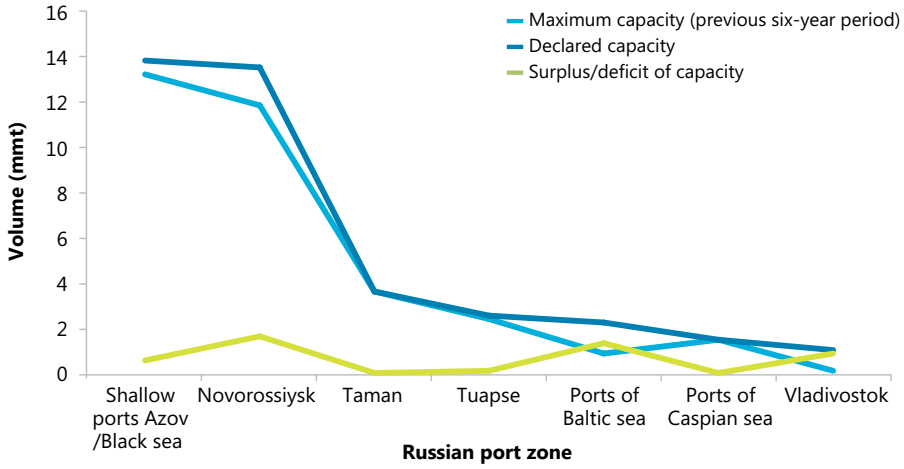


Figure 28 Current shipping capacity of the major Russian port zones

Source: http://novoroskhp.ru/

Table 13 Distance and time from Black Sea and Australian ports to major markets

	Novorossiysk		Kwinana		Newcastle	
	Distance (km)	Days	Distance (km)	Days	Distance (km)	Days
Indonesia: Surabaya	12,788	20.5	3044	4.9	6337	10.2
China: Guangzhou	14,417	23.1	6553	10.5	8267	13.2
South Korea: Inchon	16,387	26.3	8076	12.9	8786	14.1
Japan: Kashima	17,008	27.3	8346	13.4	8017	12.8
Egypt: Damietta	2343	3.8	11,779	18.9	15,618	25.0

Source: Searates 2016

Table 14 Shipping rates for panamax-size vessels*

	Novorossiysk	Kwinana	Newcastle
	(AU$/t)		
Indonesia: Surabaya	41.6	14.9	20.6
China: Guangzhou	46.9	21.3	26.9
South Korea: Inchon	53.3	26.3	28.6
Japan: Kashima	55.3	27.2	26.1
Egypt: Damietta	11.5	38.3	50.8

* Costs current as at 28 May 2016

Source: IGC, Industry sources

Duties and regulations

Table 15 lists the main duties payable within the export grain supply chain for key Russian and Australian ports.

Export taxes

Russian grain exports must navigate an export tax system. The tax is levied when grain is sold, above a threshold price, on the difference between the contract price and the threshold price. The current duty is set at 50 per cent of the contract price minus 11,000 roubles (AU$231), with a minimum of 10RUB/t. The tax is levied at the time of customs clearance meaning the contract price, which may have been locked in four or five months before in USD, is not the price used to generate the tax rate. In the period between the price agreement and the shipping, exchange rate fluctuations will affect the duty levied on the grain. Additionally, the price used to determine the duty at the time of clearing customs is an estimation of the current price on the world market, to minimise the effect of transfer pricing between companies.

Given the threshold price is set higher than the current USD FOB prices for Russian wheat, much of the grain will be exported at the minimum charge, unless there is another severe depreciation of the rouble.

The manner in which the tax is levied will affect higher-protein wheat more than softer wheat, which is less likely to breach the threshold price. However, given the arbitrary nature of the tax, this is unlikely to affect strategic, long-term decisions by Russian wheat growers.

Table 15 Grain supply chain duties for wheat export

	Russia	Australia
Duties	AU$/t	
Quarantine certification		0.30
Export tax	0.10	
Industry levies		2.80
Total (duties)	0.10	3.10

Source: Industry Sources

Top view of the marina and quay of Novorossiysk. Urban landscape of the port city.

Russian wheat — milling and end-product quality

In export markets where both Russian and Australian wheat is used, Russian milling wheat is generally perceived as a medium protein, medium hardness wheat. Depending on its particular characteristics, Russian milling wheat can approximate Australia's feed, General Purpose (GP) and Australian Standard White (ASW) grades.

An additional factor to consider for Black Sea and North American wheat, yet not applicable in Australia, is any quality differential between winter and spring wheat. This can be important whenever seasonal conditions particularly affect harvest in either region.

In general, millers in Asia tend to consider Russian wheat as a low-cost filler, more suited to baking than noodle production. However, if the premium for Australian wheat is large enough, then judicious blending of Russian wheat can raise its inclusion rate in economy grists, where it can perform satisfactorily in the absence of specific end-product functionality requirements. However, many mills in Asia view wet gluten of at least 30 per cent as a key requirement for the premium noodle segment and at least 40 per cent for the premium baked goods segment. In the experience of these same millers, most of the Russian cargoes they have milled have fallen short of this level, so Russian wheat is yet to make meaningful inroads into the top end of Asian markets.

Compared with South East Asia, Russian wheat enjoys significantly greater market acceptance in the MENA and Sub-Saharan Africa (SSA) markets. This is due to the longer history of use of Russian wheat in this region, as well as the ability of flat breads to tolerate a wider range of quality parameters without adverse effects, in terms of end-product quality. Wheat that is unsuitable for premium yellow alkaline noodles (YAN) or sponge and dough bread is often perfectly acceptable for MENA flat breads.

However, there is a misconception the MENA region will accept wheat of any quality as long as it is the cheapest option at the time. Entire regions, such as the MENA region, are rarely homogeneous. Apart from Egypt's GASC wheat tenders, there are other parts of MENA and SSA with nascent market segments with more discerning tastes.

A major miller in one such market indicated that Australian Premium White (APW) at 10.5 per cent protein is typically assessed against 12.5 per cent protein Russian milling wheat. According to this particular miller, APW still has a clear advantage in terms of test weight, milling extraction, gluten (quality and quantity) and consistency of kernel size. However, with APW currently trading at a AU$50-60 premium[3] (delivered), the question is not simply one of absolute quality but whether APW is worth these premiums. The answer to such a question depends on the region and the end-product being milled.

It is worth noting that mills in the MENA region have many alternatives beyond Russian and Australian wheat, with cargoes from Canada, the USA, Kazakhstan, Poland, Germany, Hungary and Romania also being utilised. When assessed against this range of exporters for use in the non-flat bread baked goods segment, while Russian wheat is perceived as being inferior to Australian and North American wheat, it possesses a distinct quality advantage compared with emerging Eastern European wheat exporters. Looking beyond this 'next wave' of Eastern European producers, for the bakery segment, Russian wheat also is often preferred to more established neighbours, such as Ukraine, on a like-for-like basis.

Benchmarking

Due to the growing importance of both Russian and Ukrainian (and to a lesser extent, Kazakhstan) wheat as a competitive threat in Australia's export markets, AEGIC has established a benchmarking program to assess crop samples from the Black Sea against Australian equivalents. This annual process will involve acquiring representative grade samples and assessing for grain quality and end-product functionality.

It is premature to draw firm conclusions from the small-scale trials, but the preliminary results (Table 16) suggest perceptions regarding the relative characteristics of Russian and Australian wheat are at first sight reasonably accurate. After the sample size (in terms of both intra-season and inter-season data points) has sufficient statistical significance, it is envisaged the results of this benchmarking activity will be provided to stakeholders. To this end, AEGIC has established a process for obtaining crop samples from Russia, Ukraine and Kazakhstan. Surprisingly, it has been more straightforward to obtain Black Sea crop samples than it has been to obtain Australian equivalents.

Naturally, it would be inadvisable for the Australian industry to use the results of this initial benchmarking as the basis for determining future strategic commercial or policy responses. This is particularly the case where initial benchmarking fails to reveal substantial distinctions between samples. However, to some extent, where there are major differences between Russian and Australian samples, and the results align with market perceptions, it can provide tentative affirmation. In some cases, this can then be used to help direct research efforts towards activities with better prospects for tangible commercial benefits.

3 Spread indicated by industry sources in April 2016.

Table 16 High-level distinction between Australian and Russian wheat, based on internal benchmarking and miller feedback

Parameter	Type	Russian	Australian
Test weight	Grain		✔
Falling number	Depends on season		
Wet gluten	Grain		✔
Water absorption	End-product		✔
Extraction rate	End-product	Depends on milling process	Depends on milling process
Loaf volume (bread)	End-product	✔	
Crumb softness (bread)	End-product		✔
Dough strength (bread)	End-product	✔	
Noodle brightness	End-product		✔
Noodle colour stability	End-product		✔
Noodle texture	End-product		✔
Starch paste viscosity	End-product		✔
Flat bread score	End-product	Same	Same
Noodle yellowness	End-product		✔
Price	Value	✔	

Implications of milling and end-product quality differentials

On any given day, a mill's purchasing decision will generally be a function of attributing a nominal value to each of the parameters in Table 16 to produce an 'apples-with-apples' comparison, which can be contrasted against the price premiums for wheat from different origins. It is for this reason that focusing on price, to the exclusion of quality (and vice versa), can potentially lead to suboptimal decisions. Price and quality considerations are key components of purchasing choices.

In turn, understanding buyer behaviour and the competitive wheat export landscape is crucial for developing a sound industry strategy for the Australian wheat export industry. Knowing countries' costs of wheat production, wheat prices in various markets and the end-product quality requirements in those markets is useful information to help frame strategy. For example, if prices for Russian wheat and its Australian equivalent means Australian wheat trades at a modest price premium, then the superiority of key quality parameters for Australian wheat are critical, as these can trigger purchases by mills. However, if APW trades at a AU$50 premium to the comparable Russian grade, then unless a mill can extract a sufficient premium from second-stage processors, who can do likewise with their own customers, functionality above a certain minimum is largely irrelevant.

While much of the MENA region mostly targets the cheapest available wheat, there is ample demand for high-quality, differentiated wheat in most Asian wheat export markets. At one end of the spectrum are markets such as Japan, where the bulk of its demand has prescriptive functionality requirements. Further along the spectrum are countries where there is nascent demand for such wheat to meet the requirements of a specific segment of the market, with the remainder of demand still coming from the price-sensitive 'economy blends'.

As economies develop and diets Westernise, the growth of this differentiated demand is expected to outpace any growth in wheat production in Australia. It is therefore critical the industry quantifies what the scale of the demand for differentiated wheat in key export markets will be in coming years. There is an enormous difference between a situation where Australia's share of a static market is being eroded by cheap Black Sea wheat, and a situation where strong demand in total demand sees emerging low-cost suppliers capture the bottom end of the market, leaving Australia and North America with the top end of the market.

Unlike Russia, Australia does not have much arable land ready to bring online to take advantage of a growing wheat demand in export markets. Even if such land were available, it would be, by definition, more marginal, and therefore would have even greater difficulty competing at the bottom end of the market. Consequently, Australia may likely be in a situation where its share of the overall market erodes, yet Australia benefits from growth in the discerning end of the market. Quantifying this will be part of AEGIC's future market-focused research.

Right: Poster from 1948 portraying the importance of wheat and bread in the Soviet union: "To work hard is to be with bread".

Source: M.M. Soloviev http://sovietart.me


ХОРОШО ТРУДИТЬСЯ-
Весна
Лето
Осень
Зима
ХЛЕБ УРОДИТСЯ!

Grain exports

Export make-up

During the past 15 years, Russia has gone from being a net importer of grain to emerge as one of the world's largest exporters of wheat, barley and sunflower oil (Figure 29). This transition has been supported by a number of factors including: government support, currency depreciation, increasing yields and, with the exception of barley, an expanded area being cropped.

Russia's agricultural grain and oilseed exports are largely made up of wheat, sunflower oil, corn and barley (Figure 29). Since the early 2000s, it has become one of the world's top-ranked exporters in three of these commodities: wheat, barley and sunflower oil.

This recent growth in exports is in part a product of Russia's political and social agenda to ensure food security and self-sufficiency in food production, particularly regarding animal production. During the 1990s livestock production in Russia dramatically contracted (Liefert and Liefert, 2015a), so during the 2000s the shift in agricultural policy has been towards rebuilding Russia's livestock sector.

Grain exports are an indicator of the production success of Russia's grains sector. However, exports are not the primary goal. Self-sufficiency in food production and supplying feed to bolster Russia's livestock numbers has been a policy focus during the past decade or so — although since the loss of energy export revenues after 2014, grain export revenues have grown in relative importance as a source of foreign exchange earnings.

By contrast, in Australia with its relatively small population of around 25m, food security and self-sufficiency are not policy priorities. Rather, wheat production for export is the primary focus of many Australian grain-growing operations.

The Southern and Central districts are the prime areas for production and export (Table 17) in Russia. These two districts accounted for nearly all of Russia's grain and oilseed exports on average from 2013–15 (CSFT).

Wheat

Since the late 1990s Russia has shifted from being a net importer of wheat to being a global exporter (Figure 30). The increasing export volumes have been made possible through production increases combined with a steep decline in use of wheat as an animal feed during the 1990s and a flat trend in domestic consumption for wheat as a food ingredient (Figure 30).

From 2008–12, wheat provided one-third of the total volume of Russia's agricultural and food exports, and became the most important crop in relation to both export earnings and farm income. Wheat has comprised about 75 per cent of the total value of grain and oilseed exports from Russia on average from 2013–15. However, such a high dependency on one crop can be a serious threat to the enterprise and industry sustainability, as is the situation in some grain-growing regions of Australia.

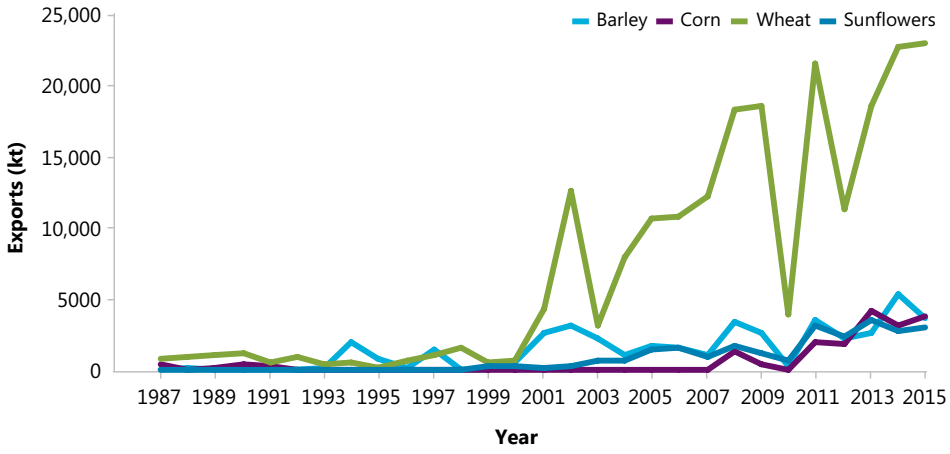


Figure 29 Change in exports of main grain crops in Russia (1987–2015)
Source: FAOStat

Left: Grain terminal in the port of Kavkaz on the Taman Peninsula, Azov Sea.

Table 17 Change in exports of main grain crops in Russia (1987–2015)

	Production (mmt)	Proportion of total exports (%)
District	**Wheat**	
Central	11.93	10
Southern	24.04	84
Volga	9.22	3
Ural	2.96	1
Siberia	8.91	2
District	**Barley**	
Central	6.21	na
Southern	3.31	na
Volga	4.42	na
Ural	1.10	na
Siberia	2.12	na
District	**Corn**	
Central	4.17	na
Southern	6.83	na
Volga	0.75	na
Ural	0.01	na
Siberia	<0.01	na

Source: Rosstat and Rylko, 2014

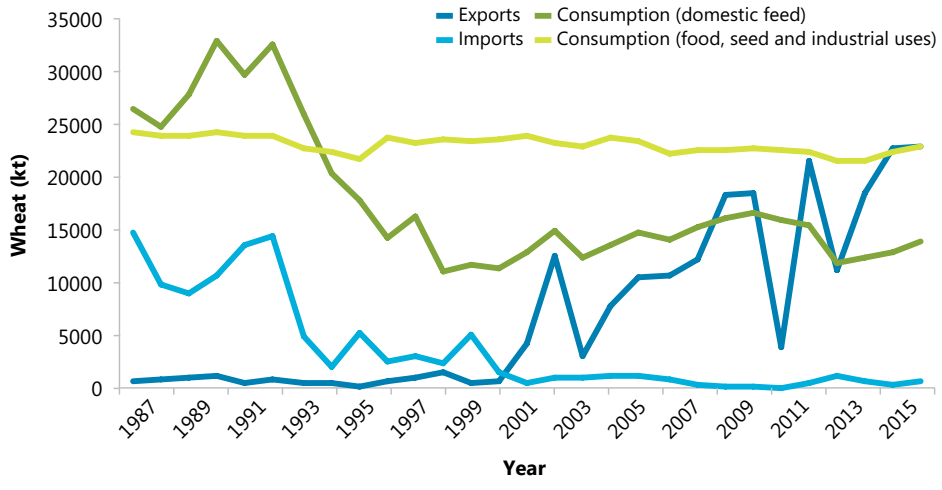


Figure 30 Change in wheat usage, imports and exports in Russia (1987–2015)

Source: USDA

Table 18 shows thus far, during the decade leading up to 2010, Russia has established itself as major player in wheat export, and with 2015/16 exports topping 25.2mmt, it recently became the world's largest single wheat exporter. Russia's share of global wheat exports on average since 2013/14 has been around 15 per cent, eclipsing Australia's share of around 12 per cent (Table 19).

Most Russian wheat is exported to countries in the MENA region, which have accounted for about 80 per cent of Russian wheat exports on average over the five years to 2015 (Table 18).

Turkey and Egypt currently dominate Russia's wheat export program, often accounting for nearly 40 per cent of all Russian wheat exports. Figure 31 shows the dominance of Egyptian wheat imports from Russia since 2005, replacing the USA's dominance in the earlier part of the decade.

Turkey takes advantage of cheap Russian wheat to bolster its massive flour milling industry, competing with Kazakhstan to be the largest miller of flour in the world.

Table 19 Shares of wheat exports from major wheat-exporting countries

Country	Export share 2013/14 to 2015/16 (%)
Russia	14.8
Ukraine	8.4
Kazakhstan	4.7
Australia	12.0
Argentina	3.5
Canada	16.0
EU-27	22.9
USA	17.6

Source: Based on data contained in USDA World Agricultural Supply and Demand Estimates reports

Table 18 Wheat exports from major wheat exporting countries

Country	Export volume (mmt)							
	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16p
Russia	18.4	18.6	38.6	21.6	11.3	18.6	22.8	25.2
Ukraine	13	9.3	11.6	5.4	7.2	9.8	11.3	15.5
Kazakhstan	5.7	7.9	6.2	11.8	6.3	8.1	5.5	7
Australia	14.8	14.8	18.7	24.7	18.7	18.6	16.6	17
Argentina	6.8	5.1	9.5	12.9	3.6	2.3	5.3	7.5
Canada	18.8	19	16.6	17.4	19	23.3	24.1	22
EU-27	25.3	22.1	22.9	16.7	22.7	32	35.4	32
USA	27.6	23.9	35.1	28.6	27.5	32	23.3	21.1

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Source: USDA World Agricultural Supply and Demand Estimates reports

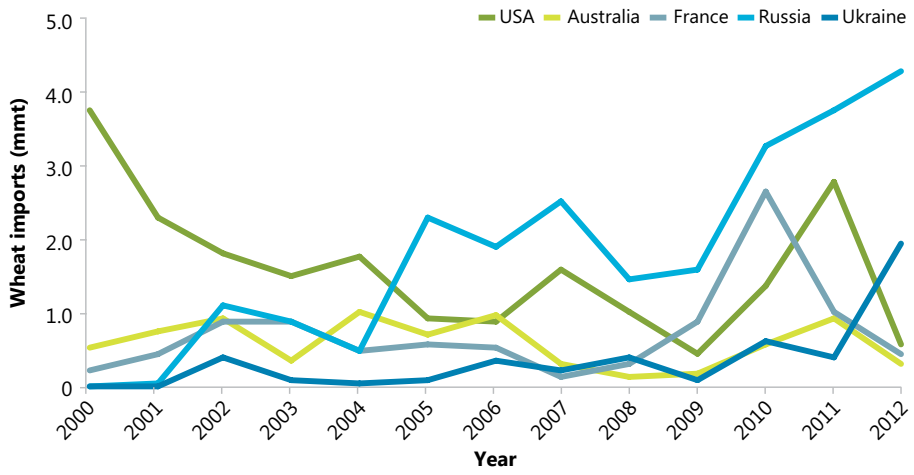


Figure 31 Origin of wheat imports into Egypt (2000–12)

Source: UN Comtrade Database

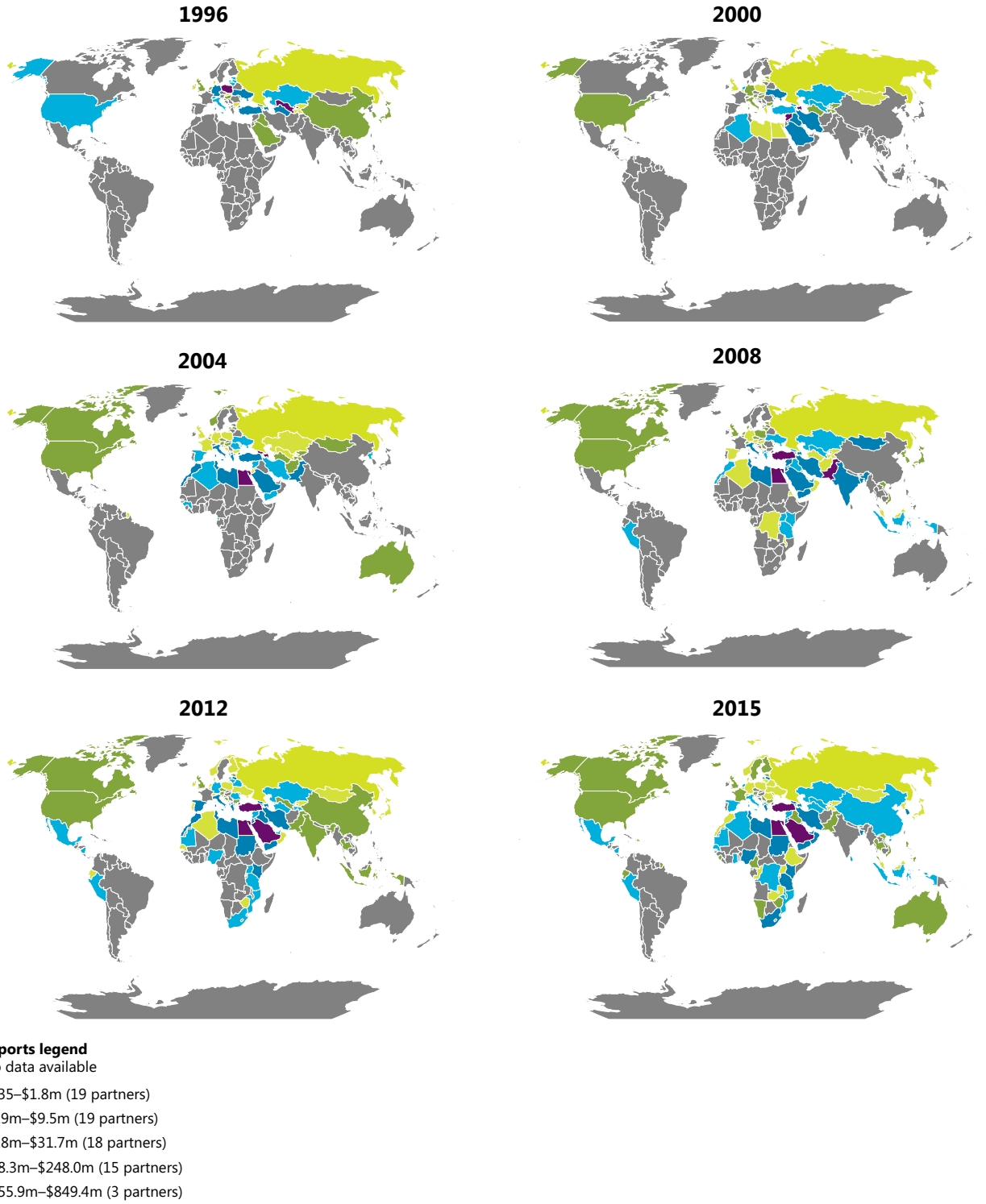


Figure 32 Destination and value of Russian cereal exports (1998–2015)

Source: UN Comtrade data

While wheat trade between Russia and Turkey is symbiotic, it could be argued Turkey needs Russian wheat more than Russia needs Turkish demand. Russian wheat can account for almost 80 per cent of Turkish wheat imports, whereas Turkey only accounts for around 20 per cent of Russia's total wheat exports.

However, when we examine the region's throughput by port, Turkey takes around half of all volume that passes through Russia's Azov Sea terminals.

This symbiosis was readily apparent in the wake of Turkey downing a Russian jet during 2015, where, despite various trade bans being put in place, wheat was one of the few exports left unimpeded. During the past few years, Russia has banned the trade of other foodstuffs for far more spurious reasons, so this is perhaps evidence the Russian government realises the importance of grain exports for its economic future.

Another possible factor is that Russia sees Turkey's huge flour milling industry as a potential springboard towards one day becoming a major flour exporter. Some in Russia have been advocating a shift towards using Turkey as a toll-miller, where Russian wheat would be processed in Turkey for sale elsewhere, allowing Russia to participate further up the value-adding process.

Egypt relies on Russian participation in the General Authority for Supply Commodities (GASC) tender process to ensure its people can access affordable wheat-based products. The Egyptian word for bread — *aish* — is synonymous with 'life', so access to wheat is a cultural and political issue of food security. Egypt is the world's largest importer of wheat and more than 40m Egyptians rely on government-subsidised wheat. Moreover, further population growth is forecast for Egypt, which will further increase its imports of wheat during coming years.

Although Russia is currently one of the cheapest sources of wheat, especially due to the devaluation of the rouble, Russia's recent history of occasionally banning or limiting wheat exports has been one of the reasons why Egypt now actively seeks alternative sources of wheat, such as Ukraine or the EU.

Exports of Russian wheat into Australia's main exports markets in Asia are growing but are currently small and highly variable. Total exports from Russia to Indonesia, Japan, Vietnam, China and South Korea from 2009–15 averaged only 0.15mmt per annum and had a large detrended CV of 102 per cent. This compares with total exports from Australia of 6.4mmt with a detrended CV of only 31 per cent.

Figure 32 shows the expansion of Russian cereal exports initially centred around the MENA region expanding across most of Africa by 2015, with varying trade levels into Asia.

Sunflowers in the field in the Rostov region in Russia.

Barley and sunflower oil

Alongside wheat, Russia is one of the world's leading barley suppliers, with about 12 per cent share of the world's barley market, on average, over the five years to 2015. Similar to wheat, most of Russia's barley, more than 85 per cent, is exported to the MENA region. More than half, sometimes as high as 60 per cent, has been exported to Saudi Arabia between 2009 and 2015.

Most of Russia's barley exports are as livestock feed, although during recent years, attention has turned to developing the Chinese malting barley market. Every year China imports more than 2mmt of malting barley (generally from Canada, Australia and the EU) for malting and brewing. However, during November 2012, at the 16th session of the Russia-China Intergovernmental Commission on Organisation of Regular Meetings between the Heads of the Governments, a four-year research cooperation was signed. This agreement ensures Russian barley breeders will develop malting barley varieties specifically for Chinese brewers. The malting barley will be grown in Russia and exported to China and countries of the Shanghai Cooperation Organisation. This collaboration aims to ensure Russian barley is tailored to the specific needs of Chinese maltsters and brewers. Russian barley exports to China, however, are currently negligible. Moreover, the quality of malting barley produced in Russia has been variable. For example, Russian malt producers usually use domestic barley for malt production, but during 2013 the quality of the barley did not meet brewers' specifications and they were forced to import malt for their requirements (USDA, 2015b).

Sunflower oil has also become an important export commodity for Russia, with the export volume increasing twelve-fold from 2002–12. Turkey and then Egypt have been the prime destinations for Russia's sunflower oil, with their Eurasian neighbours taking much of the rest.

Until recently, Russia's lack of adjacent oil crushing and deep-water export terminals made it difficult to compete with Ukraine, who harnessed the benefits of such infrastructure in order to capture the lucrative Chinese and Indian 'vegoil' markets.

This situation is set to change with the construction of oil crushing facilities alongside existing vegoil export infrastructure on the Taman peninsula, by EFKO, who is a large player in Russia's vegoil market.

With additional projects slated for commencement, including a similar set-up in Novorossiysk, Russia is expected to make further inroads into this market.

As is the case in Ukraine, the relative attractiveness of each cropping option in Russia, at a given point in time, can influence wheat production volumes. So while developments in other crops, such as the above-mentioned improvements to Russia's sunflower oil export competitiveness, may appear tangential, there can be substantial second-order effects that alter gross margins for wheat-growing in Australia. This lends further support to the need for monitoring developments in Russia.

Although the domestic uses of wheat in Russia have been mostly stable during the past 15 or so years, production volatility, principally due to climate variability, has been more pronounced.

The CV of undetrended wheat yield in Russia since 2000 is 0.13, which is not large in comparison to the CV of wheat yields in many other wheat exporting nations. Table 20 lists the CV of cereals yields over the period 2006–14 across a range of countries. Although the CV data indicate Russia is relatively reliable for yield of cereals (especially wheat), the data are national figures and disguise the greater yield and production variability known to exist in the key wheat export regions of Russia (Table 5 and Table 6). Export reliability is a function of several factors not just national yield reliability. Russia's reliability as a wheat exporter is conditional on several factors:

(i) the rouble remaining sufficiently devalued to ensure wheat exports from Russia remain attractive to overseas' buyers

Table 20 Coefficients of variation (not detrended) of cereals yields for various countries (2006–14)

Country	Coefficient of variation in cereal yields
Russia	0.11
Australia	0.23
Ukraine	0.23
Canada	0.10
France	0.08
Germany	0.08
USA	0.08

Source: Based on World Bank's World Databank data

(ii) investments in export grain infrastructure continue to keep pace with export volumes

(iii) investments in wheat breeding and adoption of modern crop technologies increase

(iv) climate change impacts do not worsen and thereby weaken Russia's ability to export wheat.

While yield and production variability are important features of a country's grain sector (Table 20 and Figure 33), even more important to global grain markets is the volatility of a country's exportable surplus. Due to Australia's small domestic market for wheat it often has sizeable exportable surpluses. Hence, currently the CV in Australia's exportable surplus is less than that for Russia, Ukraine and even the EU (see Figure 34).

However, Russia's population is stable, Ukraine's population is declining and Australia's population is increasing. Moreover, yield and production increases are greater in Russia and Ukraine compared with Australia. These changes could gradually lower the CV in the exportable surplus of wheat in Ukraine and Russia relative to that in Australia, gradually eroding Australia's status as a preferred reliable supplier.

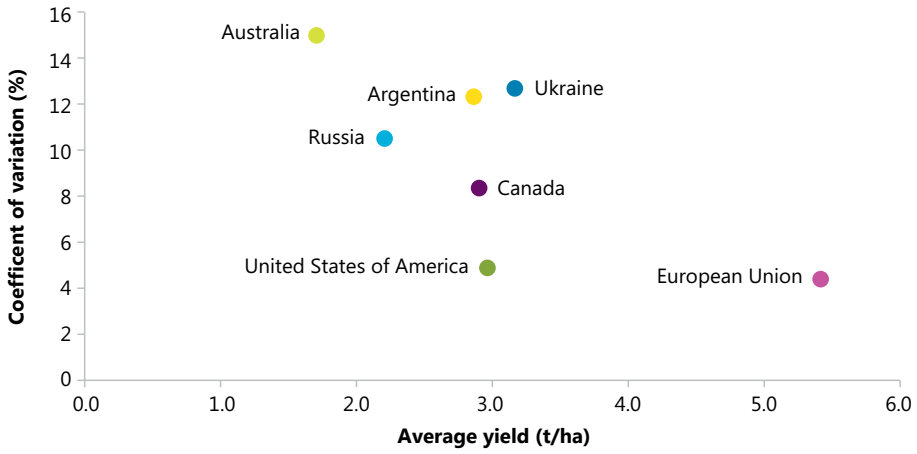


Figure 33 Coefficient of variation in detrended wheat yields for major exporting nations

Source: Based on data from USDA (2016)

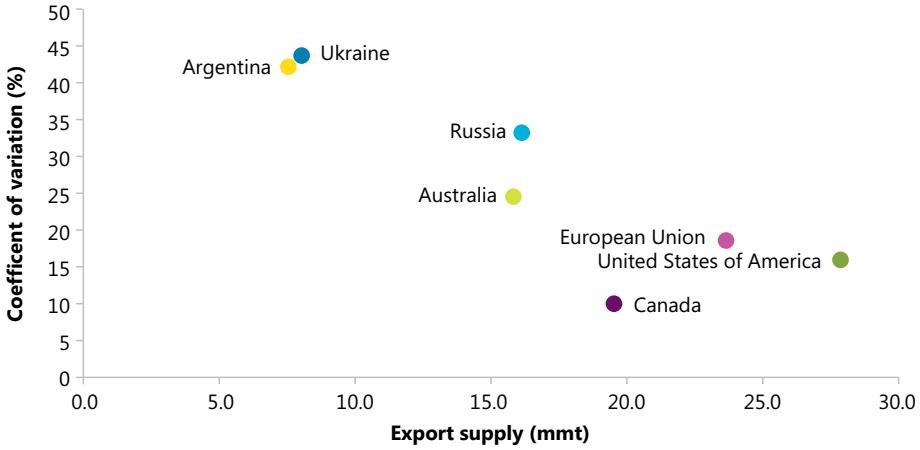


Figure 34 Coefficient of variation in detrended export supply volumes from major wheat exporting origins (2006–16)

Source: USDA (2016)

Left: Barley field, Kaluga region, Russia.

Prospects for the Russian wheat industry

Long-range predictions are fraught with danger. In particular, there is a tendency to imagine a future that is a simple extrapolation of whatever trend is in place at the time of prediction. However, trends can change, giving way to a new trend. Furthermore, the accuracy (and therefore, usefulness) of forecasts tends to diminish as the time horizon is extended and often much 'noise' can surround a trend.

This is particularly the case regarding countries in the Black Sea region, including Russia, which during the past two decades have been subject to more marked change and volatility than has occurred in other wheat-exporting regions such as North America or Australia. We can, however, identify a range of plausible scenarios that encompass Russia's recent past, as well as canvass key aspects likely to affect Russia's ability to increase its grain production in the future.

Even accommodating its recent past, Russia remains the largest grain producer in the Black Sea region, but it has, since the collapse of the Soviet era, also experienced the largest decline in grain area. This area lost to grain production was land that was either less productive or less economic for grain production, due to high production costs or expensive supply chain costs. A future scenario that would see this area to return to production requires either world grain prices to be high for several years and/or the Russian rouble to remain devalued against the USD and on par or devalued against currencies of other wheat-exporting nations. Those market conditions would ensure the required capital investments would be made to bring those marginal lands back into production (Liefert and Liefert, 2015b) and similar investments would be made in cost-effective handling and transport infrastructure. However, most grain analysts indicate, at least for the next few years, grain prices are likely to remain low and the rouble is unlikely to further depreciate. Hence, marginal lands are unlikely to be enticed back into grain production, at least during the next handful of years (Liefert and Liefert, 2015d).

While some Soviet-era ports, such as Novorossiysk, were originally geared to import grain, rather than export it, by the turn of the millennium, these ports had been converted to export terminals and were supplemented by a number of greenfield port terminals purpose-built for export.

The rapid and significant depreciation of the rouble since the end of 2014 has given further impetus to grain exports from Russia. However, a depreciated currency does have some downsides. When a country depends heavily on imported goods and services then domestic cost inflation can arise following a dramatic devaluation. Importing foreign agricultural machinery, technology and services becomes more expensive. Locally-manufactured machinery, technology and production inputs can become subject to cost inflation and accessing those inputs often becomes conditional on access to credit, yet high interest rates, which often follow a dramatic devaluation, limit such access. During such periods of structural adjustment, government funds are often diverted into social services and economic management. Funding support for R&D and long-lived infrastructure generally is wound back. In Russia, support for R&D already has been constrained, leading to the exodus of a proportion of younger researchers seeking better prospects outside of Russia.

The depreciated rouble nonetheless makes export prices of Russian wheat more attractive to overseas buyers. The profitability of wheat production for Russian growers is boosted, although fully capitalising on these export prices is difficult when farm production relies on access to credit for machinery upgrades and access to new technologies. Also, Russian government foreign policy, corruption and bureaucratic inefficiency impede the ease and affordability of access to markets, technologies, equipment and services.

While these shortcomings in terms of government trade policy, corruption and bureaucratic inefficiency impede foreign investment in Russian agriculture and its related infrastructure, Russia relies far less on foreign investment capital than its neighbours in Ukraine. This is at least partially reflected in the degree to which each government seeks out foreign sources of investment to help grow their agricultural sectors. Naturally, during periods where government spending is constrained by weak commodity prices, as has been occurring since the fall in energy prices, foreign capital can play a more important role. However, whereas investment in Ukraine's agricultural sector would grind to a halt without foreign investment, Russia has the means to fund a large proportion of required investment using domestic investment capital.

Even if more buoyant economic conditions return to Russia, to provide the Russian government with greater revenues to spend on agricultural R&D, farmer credit subsidies and infrastructure to support grain production, these types of benefits could be offset if there was an off-setting appreciation of the rouble against the USD. Such an appreciation would weaken the export competitiveness of Russian grain compared with similar grains available for export from nearby countries, such as the Ukraine. However, based on currently foreseeable conditions, there is a low likelihood of significant appreciation of the rouble against the USD, therefore the prospects for additional grain exports from Russia are likely to remain positive.

Forecasting future grain production and export volumes from Russia and its nearby Black Sea neighbours (Ukraine and Kazakhstan) has other problematic uncertainties — other export competitor currency movements, impacts of climate change and changes in Russia's domestic consumption, government policies and investment activity. It is easy, unfortunately, to form inaccurate forecasts about

grain production and exports from Russia and its Black Sea neighbours. For example, Brock (2008) commented how Russia and Ukraine's competitive advantages were yet to be realised and he outlined the perceived fundamental weaknesses preventing these countries becoming even 'moderately sized in the world grain export market'. Yet during the past few years both Russia and Ukraine have become significant global players in crop exports, especially for wheat. For example, during 2015/16 Russia exported 25.2mmt of wheat, 4.7mmt of corn, 4.2mmt of barley and almost 1mmt of pulses, with total exports exceeding 35mmt. By contrast Australian exports of wheat and barley have averaged 19.4mmt and 5.9mmt respectively from 2010–15.

A major driver of current growth of grain production in Russia has been the relatively high profitability of crop production in recent years. This profitability has been supported by a weak rouble, a growing demand for feed grains in the poultry and livestock farming sectors and additional export demand. Russian agroholdings, in particular, are capitalising on this opportunity. These agroholdings use modern agricultural technology to lift grain yields and improve yield stability.

As shown in Figure 35 Russia still faces yield upside, particularly in crops such as corn and sunflower, which depend on modern biotechnologies and machinery. Crops such as corn will benefit from any increased demand for feed in the livestock sector. The poultry and pork sectors are growing at six per cent per year — requiring 200,000t of additional grain annually. UkrAgroConsult has forecast that, by 2033, the consumption of grain for food will be largely unchanged from levels in the early 2010s, while feed demand will grow by around 10mmt (Table 21). However, such feed growth requires domestic consumption of meat to increase by 2–3mmt, along with substantial growth in dairy consumption. At present, domestic demand for animal protein is already saturated with supply and the global milk market is in a state of oversupply. Therefore, UkrAgroConsult's estimate of growth in feed demand of 10mmt by 2033 could prove to be overly optimistic.

Another component influencing the future of the grains industry in Russia is the gradual emergence of a biofuels sector. During 2012, Russia approved the 'Comprehensive program for the development of biotechnology', which aims to promote the production of liquid biofuels. According to this program, the share of biofuels should reach 10 per cent of total consumption by 2020. Whether this program will achieve this outcome is uncertain, especially in light of the marked reduction in oil prices since late 2014. However, it does signal a desired demand for biofuels, which if mandated would help underpin local demand for grain in Russia during coming years.

Another trend underpinning Russia's growing wheat production is the gradual adoption of winter wheat during the past 15 years. A range of factors has driven this phenomenon, such as growing export demand and a warming climate. Equally important have been improvements in winter kill resistance associated with newer winter wheat varieties. In addition, while winter wheat tends towards greater yield variability compared with spring wheat, it generally delivers a modest lift in yields.

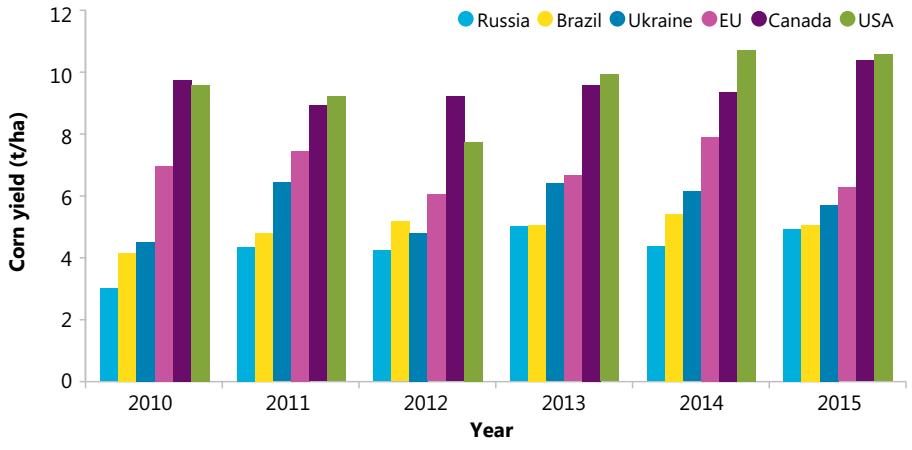


Figure 35 Country comparison of corn yields

Source: USDA FAS, PSD on-line query

Table 21 Russian grain consumption (2013–33)

	2013	2014	2016	2021	2026	2031	2033
	(mmt)						
Food industry	21.5	21.6	21.6	21.6	21.5	22.0	22.0
Feed industry	33.3	34.5	35.0	37.0	39.0	41.0	42.5

Source: UkrAgroConsult

The projections for Russian wheat production towards 2024, as provided by the USDA (2016), indicate Russia's share of the global wheat trade will increase (Table 22). The USDA projects the EU, the USA, Canada, Russia, and Australia will provide 73 per cent of world wheat trade in 2025/26. The USDA projects the former Soviet Union (FSU) region will continue to exhibit the fastest growth in world export share, rising from its 12 per cent share during the late 1990s to 22 per cent over the past decade, forward to a projected 27 per cent share by 2025/26. Increased market shares are forecast for Russia but not Ukraine. Wheat exports from Russia, Ukraine, and Kazakhstan have been strong during the past five years and are projected to climb from 40mmt in 2016/17 to 50.8mmt by 2025/26, accounting for 42 per cent of the projected increase in world wheat trade. The USDA comments that:

> *"... although not explicitly reflected in the projections, year-to-year volatility in FSU wheat production and trade is likely because of the impact of the region's highly variable weather".*

Russia's exportable surpluses of wheat are partly made possible by a greater growth in domestic production relative to domestic demand in the flour milling and feed industries. Russian wheat production during the coming years is likely to be increasingly underpinned by modern production methods, which will further lift crop yields. It is possible, but unlikely, that large increases in the area sown to wheat across Russia will occur. Moreover, even if there is a greater demand for utilisation of feed grains in Russia, satisfying that demand will mostly come from enhanced production of corn, soybeans and barley rather than wheat. While genetically-modified (GM) crops remain proscribed in Russia, if this were to change it would disproportionately benefit corn and soybean production through yield uplift and rotational benefits. No doubt the government is keen to boost agricultural output, but they are certain to be less keen on being beholden to the US-based conglomerates, who control the most commonly-used soybean and corn GM variants.

It is important to note that even with the recent boom in grain production in Russia, there has been no rush to re-cultivate Soviet-era agricultural land, with the area planted seemingly finding an equilibrium at just less than 80m ha.

Any future expansion of grain production area will depend on a handful of factors, such as: large-scale supply chain investments, further advancement in seed technology, a warming climate and the creation of consumptive demand in areas located far from the Black Sea.

In a recent discussion paper, focused on the future of grain production in Russia, there was a clear emphasis on fostering the development of 'deep grain processing' industries, such as: biofuels, bioplastics and specialty by-products. The first tentative steps are already underway, with plans for investment in the production of lysine, which is a critical additive in compound feed rations. High-value value-added products, such as lysine, starch and gluten, have a healthy margin structure that can support much longer pathways to market than unprocessed grain.

Under the Soviet-era *Virgin Lands* program, agricultural production on the Siberian steppes expanded into farmland of questionable viability. Due to the remote location, far from the main sources of demand to the west, grain produced in Siberia had to be either consumed in the Far East, or be sent south to Kazakhstan. Therefore, unsurprisingly, much of the area lost to grain production in Russia following the collapse of the Soviet Union was the land located too far from sources of demand pull, such as ports and domestic flour mills.

While grain production has now reclaimed much of the economically viable farmland abandoned during the early 1990s, huge swathes of Soviet-era farmland lay idle to this day. According to official Ministry of Agriculture estimates, 19.7m ha of arable land is not currently used for agricultural production of any description. Of this, 1.8m ha has not been used for two

Table 22 Wheat export projections towards 2025: major wheat-exporting countries

	2014/15		2015/16		2016/17		2025/26	
Exporters	Exports (mmt)	Share (%)	Exports (mmt)	Share (%)	Exports (mmt)	Share (%)	Exports (mmt)	Share (%)
EU	35.4	21.6	33.5	20.9	33.0	20.5	37.7	20.2
Canada	24.1	14.7	20.0	12.5	21.1	13.1	23.5	12.5
Australia	16.6	10.1	18.0	11.2	19.0	11.8	19.7	10.5
Argentina	5.5	3.3	5.0	3.1	6.3	3.9	7.3	3.9
Russia	22.8	13.9	23.5	14.6	20.9	12.9	28.5	15.2
Ukraine	11.3	6.9	15.0	9.4	11.5	7.2	12.9	6.9
USA	23.2	14.2	21.8	13.6	24.5	15.2	28.0	15.0
Other	25.3	15.4	23.6	14.7	25.1	15.6	29.6	15.8
Total	164.2	100.0	160.4	100.0	161.4	100.0	187.3	100.0

Source: USDA

years; 8.6m ha has not been used for between two to 10 years; and 9.3m ha has not been used for more than a decade.

As argued previously, for this area to return to export-oriented production, global wheat prices would need to rise significantly and then hold at those levels for a sustained period to cover the large costs associated with overcoming soil fertility and distance constraints. For example, returning long-term fallowed land into crop production would require a substantial outlay just to clear the land in preparation for grain production. In addition, investments in supply chain infrastructure, such as storage, as well as road and rail connections, will be needed. Even with these issues addressed, the tyranny of distance remains, so the notion that the global wheat market will soon be awash with Siberian wheat appears unlikely.

However, another way of bridging the geographical gap between production and consumption in this part of the country is to move existing demand, or create new sources of demand within easy reach of grain production in Russia's interior and far east. Some possible candidates include the previously mentioned crop-based pharmaceuticals or advanced biofuels with sufficiently high margins to cover the costs of the long-distance transport of the finished goods.

Over the next 2–5 years it is unlikely international grain prices will persistently rebound to attract additional cropland into production in Russia. A series of recent favourable production years in many grain-growing regions across the globe has seen accumulation of grain stocks, leading to depressed grain prices in international markets. Those prices are unlikely to shift strongly upwards to persistent levels that attract an expanded area of grain production in Russia.

Liefert and Liefert (2015b) quote studies of Bokushen *et al.* (2012) and Swinnen *et al.* (2012) that both indicate a substantial improvement in the productivity of grain production in Russia since 2000. These studies indicate productivity-enhancing farm-level improvements are contributing to the rise in grain output in Russia. Since 2000, Russian grain yields have increased because of productivity growth rather than a rise in input use (Table 23). During 2006–10, the volume of grain output was a third more than during the period 1996–2000. However, inputs used in grain production were lower from 2006–10 compared with 1996–2000. The grain area was down four per cent; agricultural labour use was 21 per cent less; grain harvester use was 37 per cent less, tractor use was 40 per cent less and petrol and diesel use was down 33 per cent. In contrast, fertiliser use doubled. Lower prices for fertilisers and more frequent favourable-weather years during the 2000s, compared with the second half of the 1990s, boosted grain production during the 2000s.

Based on sown area, the average annual Russian grain yield from 2001–05 was 35 per cent higher than that during 1996–2000, while based on harvested area, the average grain yield was only 24 per cent higher. This reflects the fact that better weather reduced the gap between sown and harvested area.

In the post-Soviet era there was a shift away from feed grain production for local livestock production into grain production, leaving more for export (Table 23). The political concern around this shift in the focus of grain production was ameliorated by improvements in the efficiency of feed use by animals enabling more meat, and other livestock product output, to be generated per unit of feed. For example, although total Russian meat production was 33 per cent higher in 2006–10 compared with 1996–2000, grain use increased by only 10 per cent. During more recent years, feed rations have altered toward an increasing share of high-protein supplements (oilseed meal and cake), weakening the demand for forages and some coarse grains.

A range of technological improvements, business restructures and investments in grain supply chain infrastructure have supported the post-Soviet era growth in grain production in Russia. Since 1999, labour productivity in Russian agriculture has increased by an annual average rate of 3.6 per cent (Epstein, 2015). Such rates were unheard of in Soviet times, especially in its agricultural sector.

Likewise, resource costs have been decreasing. From 1999 to 2010, the per rouble cost of agricultural output dropped by 42 per cent, in comparable prices, corresponding to an annual

Table 23 Indices of Russian grain output and input use* (1990–2010)

		1990–91	1992–95	1996–2000	2001–05	2006–10
Grain output		100	88	66	80	87
Input use	Area harvested	100	93	74	73	71
	Agricultural labour	100	100	89	80	70
	Grain harvesters	100	85	73	66	65
	Tractors	100	96	75	59	45
	Fertiliser	100	46	24	34	50
	Oil-based fuel	100	54	27	21	18

* Base year values are 100

Source: Liefert and Liefert (2015b)

decrease of 3.9 per cent. By illustration, the cost of fuel per unit of gross output from 1998 to 2010 decreased by 65 per cent. During 2010, agricultural enterprises consumed 77.8 per cent less energy per unit of gross output than during 1998.

Moss and Schmidt (2015) examined wheat yields in Russia, Ukraine, Kazakhstan and the Great Plains states in the USA from 1991–2013. They found that during this period the rate of yield increase in Russia was the highest among all regions. This relatively high rate of increase in yield supports Russian wheat exports. Underpinning the increase in wheat yields in Russia has been a shift in the proportion of the wheat area sown to winter wheat, which tends to be higher yielding than spring wheat.

As recently as 2013, the USDA indicated they saw Russian grain production and exports continuing to grow unabated during the next 5–10 years, with annual average output increasing by a further 60 per cent to 98mmt by 2022 (Leifert and Leifert, 2015b). However, in the intervening period, subsequent to this forecast, grain production already exceeded 100mmt, which means previous forecasts must now be revised upwards. Based on consultation with Russian-based analysts familiar with this topic, by 2022, 115-120mmt appears achievable.

Clearly, domestic demand is unlikely to keep pace with this growth in production, so a sizable portion of this upside must be absorbed by the export market. It is therefore unsurprising to note the USDA's view of Russia vying with the USA to become the world's biggest grain exporter by 2022 has in fact already occurred during 2015/16.

Like UkrAgroConsult the USDA also projects that from the 2006–12 period to 2022, Russian grain used as animal feed will increase, by 28 per cent. It is worth reiterating that total Russian meat production was 33 per cent higher from 2006–10 compared with 1996–2000, yet grain use increased by only 10 per cent. Hence, a forecast 28 per cent increase in grain used as animal feed is likely to further greatly increase animal production in Russia; especially as further gains in feed conversion efficiency occur. The already observed growth has occurred partly as a response to Russian policy of import substitution in an environment with a weak exchange rate. The substitution of imported food products, including white meat, with domestic produce has been accelerated through a set of import restrictions on those food products. If the bold predictions regarding further future growth of Russia's domestic meat production materialise, the demand for feed grain will also naturally increase. However, this future growth is far from assured, with some analysts expressing doubts as to whether this is a realistic scenario or not. Nonetheless, such is the magnitude of the expected growth in Russian grain production that, even under the most bullish scenarios regarding domestic feed demand, the export market will need to absorb an increasingly large exportable surplus.

In contrast to these projections, Lioubimtseva *et al* (2015) consider the Russian government's goals of boosting grain and meat production by 2020s are unlikely to be fulfilled. They argue that high volumes of grain exports are mostly attributable to weak domestic demand and an unusual period of favourable weather years. In addition, they concur with the view that further expansion into previously abandoned farmland is unlikely, given the questionable viability of such land for the purposes of grain production.

This bearish tone is also continued with their view that projected climate change suggests an increase in drought frequency. In particular, they predict the crucial Southern District, which is responsible for a large proportion of wheat exports, will be vulnerable (Alcamo *et al*., 2007). An increase in drought frequency also has implications for run-off into waterways, which may then have implications for barge-based movement of grain along the Volga-Don river system. However, it should be pointed out that support for this bearish scenario has waned somewhat in the face of record grain production. However, with climatic patterns often unfolding over a long period of time, it is too early to tell whether the 2015/16 bumper crop is just one harbinger of favourable climatic tendencies.

Despite this pessimistic tone, Lioubimtseva *et al* (2015) point to projected climate change generating production increases due to the combination of higher winter temperatures, an extension of the growing season, and yield-enhancing effects of elevated carbon dioxide (CO_2) levels. Interestingly, in addition, studies by Taub *et al*. (2008) indicate a lowering of protein content of grains under elevated concentrations of CO_2.

Hence, although grain production may be on an upward trend there is likely to be greater variability around this trend. Although breeding and fertiliser treatments may address a decline in grain quality and help deliver greater drought tolerance, this is nonetheless further evidence of the challenges affecting wheat production in Russia during coming decades.

Analysts' projections

The respected commercial consulting firm UkrAgroConsult identifies the following major drivers for further increases in Russian grain production:

(i) growing demand for fodder in Russia's poultry and livestock farming sectors

(ii) an increase in export demand, especially in the nearby MENA and SSA regions

(iii) commercial prosperity of grain production.

Prior to the record-breaking crop of 2015/16, UkrAgroConsult had predicted that by 2033 the crop area sown to grains in Russia would have expanded by around 2.5m ha in 2013, to reach a total crop area of at least 46.5m ha. However, as with the USDA's previous projections regarding output, which were

exceeded soon after, UkrAgroConsult's forecast for 2033 is set to be achieved during 2016/17, with total crop area estimated at 47.2m ha. In addition, UkrAgroConsult sees large-scale farms (agroholdings) continuing to account for a large proportion of total production, with greater use of modern agricultural technology further improving yields and yield stability.

The consultants surveyed corn growers in the main crop regions of Russia and found they were confident their average corn yields would reach European levels within 4–6 years.

The UkrAgroConsult projections are shown in Figure 36, indicating wheat production in 2033 will be 50 per cent higher than the annual average production from 2014–16, and in addition, corn will form a larger share of crop production.

If these trends in grain production eventuate then Russia will export more grain. The UkrAgroConsult projections shown in Figure 37 indicate wheat exports in 2033 will be more than double the annual average of wheat exported from 2014–16. By 2033 they envisage annual wheat exports to be around 35mmt.

Linked to the increasing volume of grain exports are analysts' views of Russia's export port terminal capacities. During November 2011, the USDA's Foreign Agricultural Service (FAS) issued a report on Russia's grain port capacity and transportation issues (Vassilieva and Flake, 2011) in which they noted grain analysts were estimating Russia's grain export port capacity to be about 25mmt, although by direct loading of railway wagons into ships as well as using ports from other countries, Russian exports could exceed this port capacity. Malysh (2015) provided updated estimates of Russia's grain export capacity to be closer to 34mmt. The lift in estimates indicates the direction of improved export capacity at ports. Nonetheless, if Russia's grain production and grain exports greatly increase towards 2033, as suggested by UkrAgroConsult and others, then additional significant investment in grain storage and port terminal infrastructure will be required.

Consistent with the views of UkrAgroConsult, Schierhorn *et al* (2014) predict similar large increases in wheat production

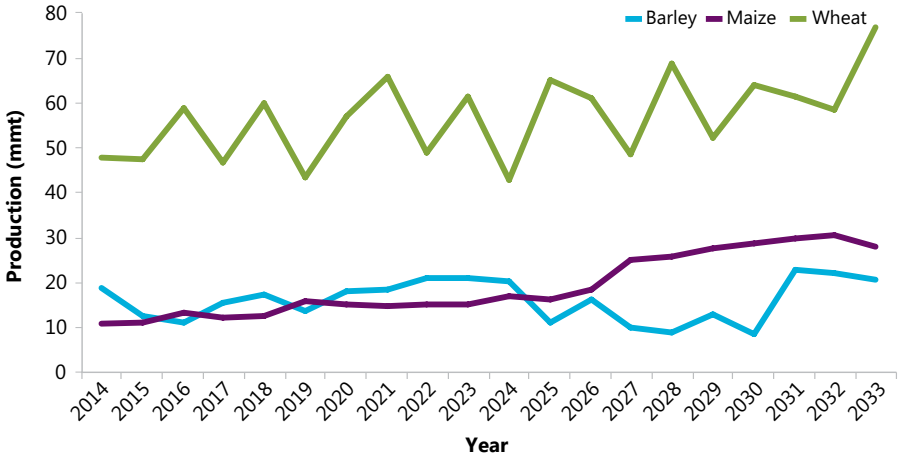


Figure 36 UkrAgroConsult projections for Russian grain production towards 2033

Source: UkrAgroConsult

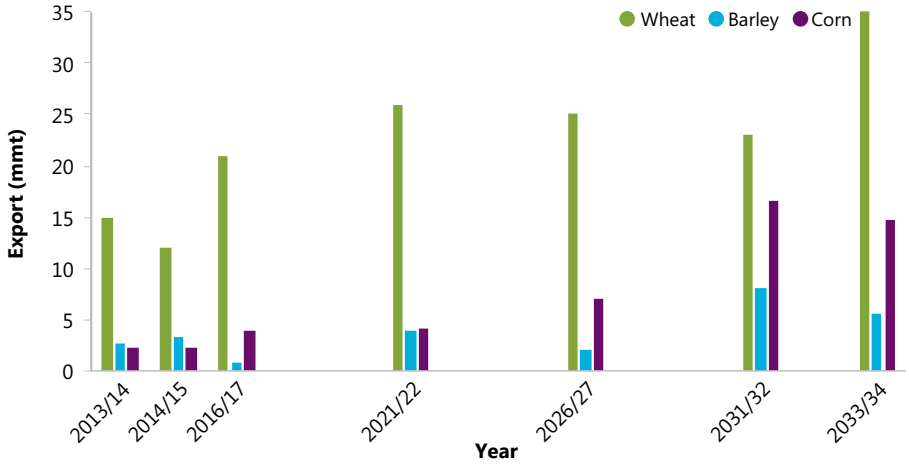


Figure 37 UkrAgroConsult projections for Russian grain export towards 2033

Source: UkrAgroConsult

over the next decade, although their estimates are wide-ranging, from 9–32mmt. The range is due to uncertainty over several factors. However, the increase in production is estimated to come mostly from intensification of cropping and limited recultivation of recently abandoned cropland. These researchers indicate most of the additional production will stem from higher yields on the fertile black soil belt in southern Russia.

Saraykin *et al* (2014) independently support the findings of Schierhorn *et al*, suggesting that by 2025 there is the potential to increase grain exports (i.e. not just wheat) to above 40mmt. These authors add the cautionary note that such growth in production is only likely if there is a sustained demand for the additional produce on domestic and world markets.

The USDA (2016) estimates Russian exports of wheat will increase to be around 29mmt by 2025, an estimate closely consistent with UkrAgroConsult's estimate shown in Figure 37. The projected increase in Russian wheat exports is of such a global magnitude that their market share will increase, mostly at the expense of US wheat. Already for 2016 the USDA is forecasting US wheat exports to be the lowest since 1972, mostly due to the volume of cheaper wheat available from Black Sea countries, the EU and Argentina. For Russia, the USDA predicts wheat will remain the dominant export crop, although corn and oilseeds will become increasingly important in their land shares and shares of export crop value.

The profitability of corn production in Russia and Ukraine can be contrasted against the current commercial challenges facing mid-west US corn growers. The University of Illinois reports these growers to be facing their third year of financial losses (see www.farms.com/commentaries/video-4-20-corn-needed-to-stabilize-grain-farm-income-107626.aspx).

There is currently a strong financial incentive to undertake wheat and grain production more generally in Russia (Rylko, 2016). A comparison of costs and returns associated with wheat production in major wheat-exporting regions of key countries reveals that during the past two years the profit margins in Russia have been the highest. While these strong commercial incentives exist, Russian wheat growers will continue to commit to additional wheat production and export growth will continue.

Consistent also with the views of UkrAgroConsult are projections contained in Russian agricultural organisations' strategic planning reports. Those reports typically indicate that from 2015–30 the total cropping area in Russia will only increase by five per cent to 49m ha. Crop yields are projected to increase by 16 per cent and internal grain consumption is estimated to increase by 18 per cent. Overall, grain production will increase by 25 per cent to total 130mmt and exports of all grains will increase by 61 per cent to be 48mmt.

The forecast composition of grain exports during 2030 is as follows: 32.5mmt for wheat, 9.7mmt for corn, 5.6mmt for barley, 0.5mmt of other grains.

For wheat, the list of countries Russia sees as prospective buyers are: Morocco, Indonesia, Philippines, South Korea, China and Algeria. It needs noting that several of these markets are currently main markets for Australian wheat. Similarly, for corn, Russia sees its prospective buyers as: Egypt, China, Algeria, Vietnam and Indonesia. Again, some of those countries are in Asia, indicating Russia's intention to shift its marketing focus towards Asia and thereby increase the force of competition in those markets.

Towards 2030 the projected carriage of grain by rail is 30.3mmt compared with the current volume of only 18.0mmt. Such an increase in volume will help lower the unit cost of rail freight, supporting the international competitiveness of Russian grain exports. Road transport will retain its dominant role, moving 53.7mmt during 2030, but its share of the logistics task is predicted to diminish to 59 per cent. The projected 61 per cent increase in grain export means increased volumes of grain will flow through grain port terminals, helping to lower handling charges at port.

In order to achieve these outcomes, the Russian authorities acknowledge the grains industry priorities need to be:

(i) increasing grain production while reducing annual production fluctuations. This will occur through yield and quality improvement of varieties and better matching of crops and rotations to suitable areas

(ii) improving the economic efficiency of grain production through growers adopting superior technologies and practices

(iii) reducing logistics costs through investments in grain storage, reducing tariffs and improving transport infrastructure

(iv) increasing exports of grain and grain products by enhancing their competitiveness through unit cost reduction and quality improvement

(v) reducing price volatility on domestic markets through improving State regulation and support.

Russian authorities also acknowledge their grains industry suffers from several weaknesses including:

(i) grain production being principally based in a few regions, which are exposed to a variable climate

(ii) a decline in soil fertility

(iii) a high dependence on some imports used in grain production (e.g. plant protection chemicals)

(iv) poor transport and handling infrastructure

(v) high debt loads of some agricultural businesses

(vi) low adoption of advanced technologies

(vii) inadequate scientific support for grain production

(viii) insufficient skilled workers in parts of the grains industry

(ix) inadequate security of investments.

Competitor analysis

Russia's relative competitiveness in wheat export markets

Since late 2012 the export price for Russian wheat has trended downwards from above US$350/t to below US$200/t (Figure 38). At prices below US$200/t it is still possible to profitably grow wheat in Russia, mostly due to the sizeable devaluation of the rouble since late 2014.

However, while the international price of wheat remains at current low prices, considerable competitive pressure will be felt by wheat exporters in higher-cost regions, such as the USA and Australia.

The break-even wheat price for many Australian wheat growers is well above US$200/t, yet the global stocks of wheat and planned volumes of production suggest that such low prices may persist, prolonging economic stress for some higher-cost grain growers.

Wheat exports from the USA during 2015/16 are likely to be the lowest in 44 years; a level last seen in 1971/72 (Bond and Liefert, 2016). Wheat stocks in the USA continue to rise and global stocks of wheat in 2016 are near record levels.

These conditions suggest Australian wheat is unlikely to be attractive to buyers in highly price-sensitive, less quality-conscious markets. It also means, given the low cost of sea freight, that even traditional quality-conscious markets may investigate the use of competitively priced wheat from other destinations and thereby Australia may experience loss of market share. However, in looking at current and future trade flows of Russian wheat, it is important to note that around half of Russia's wheat production does not make it past its own borders.

MENA region

Russia's ability to supply large volumes of low-cost wheat and the MENA region's reliance on a steady supply of cheap imported wheat, facilitates their trade relationship. Among the various markets in the region that buy Russian wheat, Egypt and Turkey[4] currently dominate, accounting for between a third and half of all Russian wheat exports (see Table 24). Turkey takes advantage of cheap Russian wheat to bolster its massive flour milling industry, which is the largest in the world[5]. Egypt relies on Russian participation in the GASC tender process to ensure its people can access affordable wheat-based products.

As previously mentioned, for Egypt, access to wheat is both a cultural and political issue of food security, with more than 40m Egyptians relying on government-subsidised wheat. Although Russia is currently one of the cheapest sources of wheat, especially due in particular to the devaluation of the rouble, Russia's recent history of occasionally banning or limiting wheat exports has meant Egypt actively seeks alternative origins for its imports of wheat, such as Ukraine or even the EU. With the political consequences of Russia's past wheat export restrictions still fresh in the minds of policymakers and GASC hierarchy, they are cautious about jeopardising their food security by relying solely on Russian wheat.

4 Depending on the definition, Turkey is considered either part of MENA or just outside of MENA (geographically), however for the purposes of this report, it is helpful to include Turkey in any discussions regarding MENA.

5 At certain times during the past decade, Turkish flour milling has been eclipsed by Kazakhstan's.

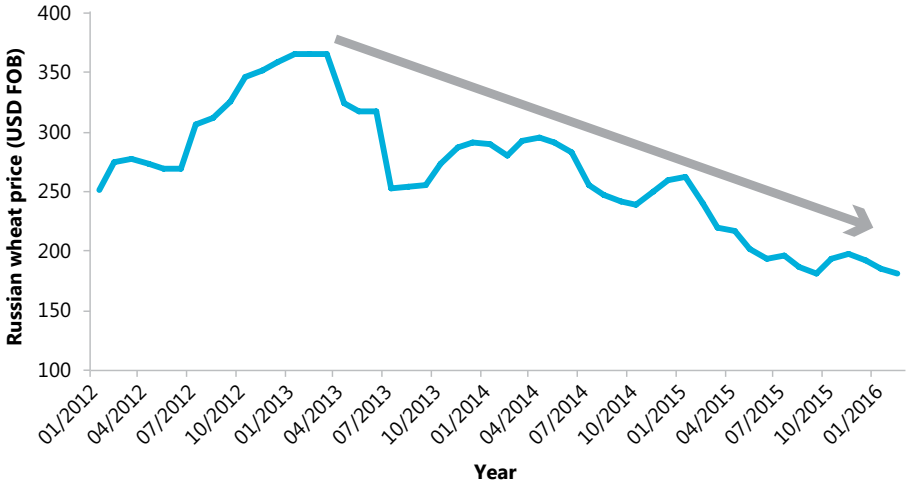


Figure 38 Russian wheat export prices (2012–16)

Source: Abstracted from Apk-inform price data

Table 24 Russia's major wheat export markets (2001–15)

Importers	2011	2012	2013	2014	2015
	(t)				
All exports	15,185,952	16,088,832	13,796,346	22,139,263	20,966,206
Egypt	4,802,375	5,232,206	2,172,776	4,057,024	4,533,808
Turkey	2,098,208	2,704,457	2,466,204	4,405,898	3,065,740
Iran	47,445	1,028,046	685,414	1,371,876	1,513,350
Azerbaijan	339,575	278,513	580,645	936,571	1,225,224
Bangladesh	109,651	0	267,401	195,035	891,727
South Africa	142,795	104,858	499,764	789,283	875,853
Nigeria	34,010	59,739	196,066	710,426	865,868
Yemen	610,314	746,516	798,214	984,319	672,651
Georgia	293,217	432,307	497,781	619,863	488,341
Kenya	711,396	219,208	424,608	525,678	476,097
United Arab Emirates	228,566	63,516	205,379	456,684	411,256
Libya, State of	252,923	575,116	376,335	387,857	372,682
Lebanon	240,780	180,900	182,456	161,604	352,064
Sudan (north + south)	180,292	209,081	344,673	867,302	336,123
Israel	512,794	553,149	414,561	478,243	330,617
Tanzania	196,773	159,256	260,066	361,923	325,904
Jordan	273,692	291,218	142,626	390,391	288,002
Oman	62,418	32,100	103,985	257,077	241,402
Sri Lanka	0	0	50,851	79,199	236,123
Indonesia	0	3040	273,442	228,127	233,100

Source: UN Comtrade

However, Egypt is unlikely to unhitch herself from the Russian grain wagon, as evidenced by the continued dominance of Russian wheat in GASC tenders. No country better represents Russia's co-dependency with MENA than Egypt, who is Russia's largest customer and, in turn, relies on Russia as their largest supplier. This relationship takes on even more complexity since Turkey (Russia's second largest wheat buyer) shot down a Russian jet it says was in violation of its airspace during 2015. Raw data would suggest Egypt needs Russia more than Russia needs Egypt, with Egypt accounting for around a quarter of Russian wheat exports, while turning to Russia for around half of their imports. However, this can (and will) fluctuate from year to year, depending on global wheat stocks and market conditions. As of mid-2016, global supplies are ample, so Egypt can readily obtain cheap wheat from multiple sources.

On the flipside, Russia will continue to rely on countries like Egypt if they are to continue with their current plan of growing their grain production base, as there is limited upside to domestic consumption, so a growing exportable surplus needs to be absorbed by export markets. Russia's motivations for growing their grains sector are not straightforward. They need to feed their own population, generate foreign exchange, reap the benefits of economies of scale in grain production yet also diversify their economy away from a reliance on oil revenues.

Wheat trade relations between Russia and Egypt serve as a reminder of the volatile geopolitical situation in the region, which can cause large changes in trade flows. For example, at one stage in recent years, GASC excluded Russia from their tender process, offering to reinstate them when the Russian wheat export situation became 'stable'. The magnitude of these sorts of changes highlights the need to monitor not only the changing Black Sea supply of grain but also the nature of the changing magnitude of the MENA demand for grain.

The lack of domestic food security in countries such as Egypt and Saudi Arabia may appear to favour Australian wheat, with its relatively stable export program and complete absence of any government intervention in grain export markets. However, Australia is often no longer a low-cost origin of wheat, yet countries such as Egypt have large populations to feed and need access to cheap grain. That is why the GASC tenders mostly feature the lowest bid prices in wheat markets and so the Egyptian market is often a last resort for some suppliers. Unless Australia suffers a weather event that triggers widespread quality downgrades, it is rarely the cheapest

option in the current global wheat market and therefore now seldom a preferred supplier to Egypt.

Figure 39 shows that Australia and the USA have experienced a declining share of Egyptian wheat imports since the early 2000s, while Russia and Ukraine have increased their share of Egyptian wheat imports.

As Russia's export destination make-up shows, the countries importing Russian wheat thin out the further they are from the epicentre of Black Sea ports. Currently, countries outside of MENA and SSA who import substantial volumes of Russian wheat are few and far between, with only Indonesia, Mexico and Peru emerging as destinations since 2014. What this also shows is that, by and large, the MENA and broader African markets largely buy their mid-protein wheat on price alone, with competitive freight often giving Black Sea suppliers the edge. This is further enhanced by the fact that Black Sea wheat tends to perform better in Middle-Eastern flat breads compared with Western-style bread, with its requirements for higher protein and dough strength.

This is why Australian exports to this region are relatively volatile, as the values only work in the event of a large crop or significant quality downgrades. That is not to devalue these markets, as they serve a vital function at particular times in Australia's yearly shipping program or in certain years. However, it would be naively optimistic to suggest the Australian industry can displace Russian wheat through judicious technical collaboration or marketing. While this may be possible at the margin, such as the production of Western bakery products as the region's tastes slowly Westernise, the bulk of these markets are content to buy the world's cheapest 12.5 per cent minimum protein wheat.

Indonesia

The increase in market share of Russian wheat entering Indonesia is of concern for Australia. Like other countries, such as Japan, South Korea and Vietnam, Indonesia is a vital customer for Australian wheat (see Table 25).

Table 25 Wheat exports from Australia, Russia and Ukraine to Indonesia

Exporter	2009	2010	2011	2012	2013
	(mmt)				
Australia	2.66	3.30	3.74	4.42	3.81
Russia	0.28	0.07	0.01	0.03	0.22
Ukraine	0.18	0.02	<0.01	0.03	0.30

Source: UN Comtrade

According to Greg Harvey, the CEO of the Interflour Group, which is part-owned by WA grower co-operative CBH;

> *"South East Asia will depend on markets other than Western Australia going forward for their wheat supply as that country is nearly tapped out. The Black Sea is expected to make up the difference".*

Harvey is expecting Interflour's growth rate to top 15 per cent per annum through to 2020 — a growth rate Australian wheat production is unlikely to match. Indonesia therefore sees a need to foster alternative origins to fuel this growth.

Indonesia's food security situation and its reliance on the steady supply of imported wheat is typically underappreciated in Australia. While Japan's lack of endogenous food security is well known, Indonesia's reliance on imported wheat (to produce affordable food, such as instant noodles) and imported soybeans (to produce tempeh and tofu) is less prominent. The importation of sufficient wheat to feed their people is important enough that the Indonesian government closely monitors the tonnages scheduled for import by major mills. With a population scheduled to grow by around 30m within two decades (more than the entire Australian population), Indonesia (and Indonesian flour millers, by extension) view the Black Sea as essential to their future food security. Among the Black Sea producers, Russia currently is poised to take maximum advantage of this stance.

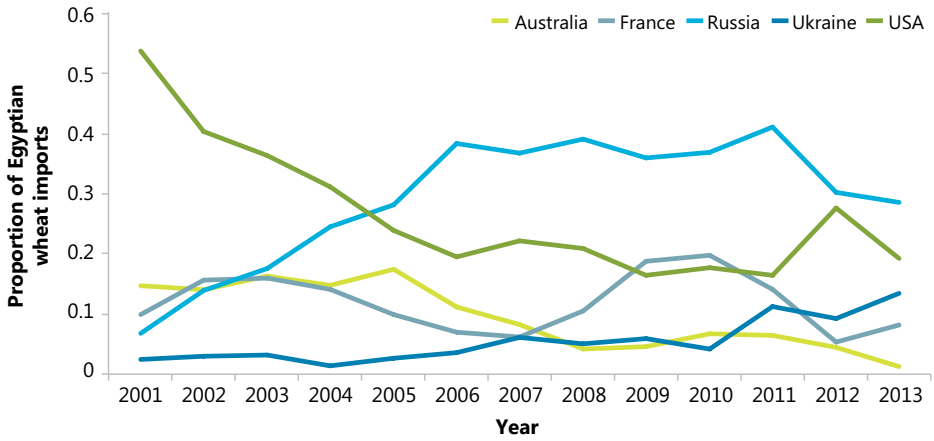


Figure 39 Share of Egyptian wheat imports by country (as a three-year moving average)

Source: Abstracted from UN Comtrade data

It is important to point out that increased Russian wheat exports to growing markets, such as Indonesia, need not necessarily be a zero-sum game (i.e. Russian wheat simply displacing Australian wheat). The size of the pie is expected to grow strongly. This may mean that despite increased Russian imports, and even if the Russian market share increases at the expense of Australia, our actual exports to these markets may hold steady or even increase. Australia is forecast to see only modest increases in total wheat production during the next 10–20 years, so it is unlikely to keep pace with the growth in Asian demand. Therefore, this trend of increased exports from the Black Sea into Indonesia need not unambiguously be a high-impact-defining event for Australian wheat exports. However, if Australian wheat quality is matched or overtaken by Russian wheat then wholesale displacement of Australian wheat is feasible.

Fortunately, based on discussions with milling experts in Indonesia, Russian wheat does not perform as well as Australian wheat in either noodles or the growing bakery market. However, the affordability of Black Sea wheat does provide a strong incentive for finding ways to increase its proportion in the ingredient mix for wheat-based products. Moreover, Indonesian purchasing of Russian wheat is not only directed at reducing the cost of the grist, but also fulfils the country's food security objectives by reducing reliance on Australia and North America. At present, Russia can generally only hope to fulfil a small proportion of the wheat blend used to produce the grist, due to both inherent quality and familiarity with Russian wheat's gristing properties. Anecdotally, Indonesian mills are comfortable with Russian wheat making up between 10–20 per cent of the overall grist. However, urged on by purchasing managers keen to keep costs down, milling experts are working on increasing this proportion.

The Australian wheat industry would be wise to closely monitor this situation. If volumes of Russian wheat being imported by Indonesia continue to increase, these volumes will generate incremental improvements in freight economies of scale and perhaps increasingly justify more targeted breeding efforts in Russia.

Moreover, when assessing the competitive threat posed by Russia into Australian wheat markets, it is vital to highlight the fact that Russia will always prioritise domestic food security over stable supply to export markets. If there is a small crop or domestic food price inflation, the government will not hesitate to put in place measures aimed at curbing exports or pushing down prices. As the recent action by the Russian government showed, they will unilaterally cut off supply to their largest customer without either advanced notice or consultation. Australia, with the luxury of a large crop and small population, is export-driven and therefore can promote stable supply as a key point of differentiation, widespread drought notwithstanding. It is difficult to imagine any Indonesian mill basing most of their grist on Russian wheat for this reason. Indonesia would be watching the situation evolving between Russia and Egypt, aware of the potential hazards of relying on Russia as a principal supplier. However, Russian wheat remains an attractive option as an opportunistic supplier of cheap wheat to make up an increased proportion of the blend.

Japan

Japan imports a tiny quantity (about 1000t) of feed wheat from Russia, whereas Australia exports between 0.95mmt and 1.3mmt to Japan.

Australia's exports comprise an ASW blend, typically around 0.85mmt, with some variation in drought years, and the remainder is Australian Prime Hard (APH) that is significantly more variable due to its highly variable export availability.

Assuming no change to the current government-controlled buying structure in Japan, there is little threat to Australian wheat exports to Japan from Russian wheat. Russian wheat is currently not approved under any of the food grade wheat tenders in Japan. However, Japan is on a gradual path to deregulation — a process intertwined with free-trade agreement discussions and the broader Trans-Pacific Partnership (TPP) agreement. If flour mills in Japan are eventually able to buy wheat privately[6] in a deregulated environment, they may look to Russia to fill a hole in the price-sensitive end of the market, such as instant noodles. Fortunately, Japan currently sources highly-specific grades out of Australia — the ASW blend (comprised of ANW1 and APW2[7]) which is used to make udon noodles; and APH that is used to make ramen noodles. Russia cannot currently supply alternatives to the functionality of these grades. While the USA and Canada can compete against APH with their Dark Northern Spring (DNS) and Canadian Western Red Spring (CWRS) grades, there is currently no equivalent in Russia or elsewhere in the Black Sea.

One potential risk could be the realisation of a viable wheat export terminal in Vladivostok, which is located in close proximity to Japan. However, the cost of rail freight within Russia makes supply of Russian grain into Japan currently uneconomical.

Philippines

Russia exports up to 0.1mmt of wheat to the Philippines, whereas Australia exports between 0.07 to 1.4mmt of wheat to the Philippines. However, the Philippine flour milling industry is currently facing a huge challenge in the form of cheap Turkish flour imports, which often land in the market at less than the cost to produce flour domestically. Anti-dumping issues aside, this naturally places immense cost pressures on Philippine flour millers, who must compete with these cheap imports. Millers will naturally look at the Turkish milling industry's reliance on cheap Russian wheat and want to engineer a similarly competitive supply base. This scenario could see Russian wheat displace both Australian and US wheat. Primarily due to

6 There is currently a process called Mimbo, which allows mills to purchase a small quantity of wheat privately to support flour re-export. However, it operates ostensibly like an export credit system, so tonnages are typically limited.

7 Depending on seasonal conditions, this blend may also include ANW2 and ASW1.

close relations with the USA post-WWII, Philippines traditionally has been viewed as a US-dominated market. Millers there are used to 'bucky' high dough strength/low extensibility North American wheats. This is a market where Australia's lack of a DNS or CWRS equivalent has been a handicap. That said, Australia still enjoys significant wheat trade with the Philippines, however it should be noted this has historically been dominated by feed grades. Indeed, with many millers, Australia needs to work towards shifting the widely-held view that Australia is solely a feed wheat supplier.

China

China currently imports little wheat from Russia, although it does import between 0.6mmt and 2.4mmt of wheat from Australia. However, recent developments point clearly towards China seeking closer agricultural ties with Russia in order to mitigate any food security issues associated with reliably feeding 1.4bn people. The first major sign of this was the recently announced US$2bn initiative between the two countries aimed at establishing an agricultural free-trade zone and the co-investment in other agricultural projects.

China's activity in grain markets during the past two years has highlighted the country's appetite for grains and oilseeds. More than 60 per cent of the Chinese population consumes wheat, in some form, every day. China is the world's single largest producer of wheat at around 120mmt on average. However, with such a large population and significant wheat production, small seasonal changes can result in relatively large swings in availability. Russia (and the Black Sea region in general) has what China wants — a wide expanse of untapped arable land. So it is envisaged the Black Sea will supply larger tonnages of wheat to China in the near future. In addition, more co-investment activity is likely. During 2014, China's main state-owned grains entity, COFCO, acquired a majority stake in Noble Group, which already had exposure to Russian grain production and trading operations. In the same year, COFCO also acquired 51 per cent of the Dutch trader Nidera, who also has a Russian grains business. These two acquisitions alone accounted for around US$2.7bn, so clearly China is a keen buyer motivated by its growing wealth and food security concerns.

According to the CEO of the Russia-China Investment fund;

> *"Russia and China's investment in agriculture will enable the development of large areas of uncropped arable land on the borders between our countries".*

This is an unambiguous statement of intent. However, the conversion of these lands into cropping will prove expensive, as will the transport of that grain to the consumption regions in southern China. A far less expensive and less risky strategy, given current low interest rates, would be for China to acquire wheat cheaply, when global stocks are large and then store that wheat for subsequent use when China's domestic harvest is inadequate. Already China holds 46 per cent (118mmt) of the global stocks of wheat as at May 2016. China's wheat stockpile was only 65.3mmt at the end of 2013/14, so China has been accumulating wheat during a period of subdued prices. By its actions, China is revealing its strategy of diversifying its sources of wheat imports while cost-effectively increasing its investment in grain stocks held in China.

To assess the impact of these developments on the future prospects for Australian wheat in China requires careful consideration. China does not view Australia as a central pillar of their food security strategy, nor could Australia realistically seek to become this. China can, in the coming years, have swings in domestic wheat production larger than the entire Australian crop.

There is relatively little overlap between the target market for cross-border Russian/Chinese wheat trade and the premium coastal markets served by Australian wheat. The Chinese market is perhaps emblematic of where Australia's future in the global wheat market lies — as a niche supplier of premium-quality wheat with targeted functionality for a range of end products. This is why, even when China has surplus wheat production, they still buy Australian wheat to fulfil a gap in their market, which is not adequately served by the quality of China's current domestic wheat.

If we look at risks to Australia's wheat exports to China, perhaps the single-most important factor is whether China and/or Russia will develop wheat varieties equivalent to or better than the functionality of Australian varieties. To this end, the Chinese government has been working with the International Maize and Wheat Improvement Center (CIMMYT) with a view to breeding varieties that perform well in Chinese noodles and steam breads. Australia would be wise to monitor these activities as they pose the greatest risks to the export of Australian wheat to China.

South Korea

Currently South Korea does not import Russian wheat, whereas it currently imports between 0.8 and 1mmt annually from Australia, consisting primarily of ASW blend out of Western Australia, plus sporadic buying of AH and APW wheat grades.

Like Japan, Korea has so far shown little interest in sourcing Black Sea wheat for food use. They do however already import more than 0.4mmt of feed wheat from Ukraine, which could provide opportunities for combination cargoes. It is not difficult to envisage the bottom end of the Korean market viewing Black Sea wheat as attractive from a cost perspective. However, based on their current usage, which is centred heavily on ASW, AH, APW, DNS, Winter White (WW) and Hard Red Winter (HRW), they have shown surprisingly little intention to follow Indonesia's path in trying to include at least some Black Sea wheat into their more price-sensitive grists. Conversations with Korean mills also indicate no intention to switch any demand to Russian or Black Sea wheat in the near future.

Iran

Iran is currently Russia's third main export market for wheat and Russia is Iran's main source of wheat imports. In addition, Iran also imports around 0.9mmt of wheat from Australia. However, the Iranian government is seeking to be self-sufficient in wheat production. Iran's wheat production for 2015 is estimated to be 11.5mmt, 16 per cent above the five-year average.

The Iranian government plans to decrease reliance on imported wheat over the next four years. Cereal import requirements during 2015/16 (April/March) were forecast at 10mmt, of which 5.3mmt was corn. Only 2.2mmt of wheat is forecast to be imported. To the extent that Iran can become self-sufficient in wheat production then Iran will be a diminishing market opportunity for both Russian and Australian wheat. It means wheat that ordinarily would have been exported to Iran will require other markets.

Russian wheat — a SWOT analysis

The SWOT[8] framework is applied to Russia's wheat industry to highlight key factors that influence its competitive strength both now and in the future. One difficulty in applying the SWOT analysis is that occasionally some factors can be advantages or disadvantages, depending on various conditions. In this section we describe those factors as 'double-edged factors'. Some of these factors have the most potential to impact the Australian grains industry. Before outlining the key ingredients of the SWOT analysis these double-edged factors are described.

Double-edged factors

1. Geography

Arguably, the two most significant double-edged factors are Russia's total arable land area and location close to the intersection of Europe, Asia and the MENA region. Importantly, both factors are regularly used to draw overly simplistic conclusions regarding the threat posed by Russian wheat in export markets. Russia's 122m ha of arable land accounts for around 10 per cent of the global total, and unlike Australia, much of it has remained abandoned since the collapse of the Soviet Union. This seemingly inexhaustible source of land creates a sense of foreboding among grain growers who increasingly find themselves competing with Russian wheat. So when the Russian Minister of Agriculture talks about increasing Russian grain production by 15–20mmt over the next decade, a collective shiver is felt not only by competition in the USA, Canada and Australia, but also in nearby countries, such as Ukraine and Kazakhstan.

Russia's large land area provides it with sufficient climatic diversity to grow spring and winter wheat and a range of other crop types. This portfolio of crops helps provide biological and industry resilience for Russia's grains industry, although Russia, like Australia, remains dominated by wheat production.

Russia's strategically significant geographical location provides it with some powerful competitive strengths. Russia can export grain from its Black Sea ports to the MENA region to the south at a significantly lower freight cost than competing grain from Australia. Alternatively, Russia can supply grain to China and certain eastern European neighbours without the need for ocean freight. In theory, grain can be exported from Vladivostok in Russia's east, a port on the doorstep of the large and lucrative Chinese, Korean and Japanese markets. However, currently the potential use of Vladivostok remains just that — a potential rather than a current actual use. The reason for its lack of use is mostly a product of Russia's geography.

Grain production in Russia is centred in regions thousands of kilometres from Vladivostok. The cost of rail freight makes export of grain out of Vladivostok mostly uncompetitive. Even if grain production moves eastwards to be nearer Vladivostok, the costs of land development and provision of required infrastructure and services are potentially wasteful investments, especially given the likelihood of low grain prices over the next handful of years. So the close proximity of Vladivostok to key Australian markets should remain, for the time being, a baseless fear, as the costs involved in transporting grain thousands of kilometres east are impractically high.

Russia does benefit from its access to all-season ports that are both near its main grain-producing regions and near major MENA grain markets. However, those ports and grain-producing regions are far from Asian markets, making Russian grain exports vulnerable to any pronounced upward movement in sea freight charges. Unlike Russia, which is mostly land-locked, Australia is an island with relatively short land-based grain haulage tasks. Australia has access to many ports and it is geographically situated on Asia's doorstep. These are important advantages for Australia. If Russia were an island nation, able to sea-freight grain to South East Asia, then the prospects for export of grain from Australia would be very different.

2. Geopolitics

The military might of Russia and its preparedness to use its force serves, yet on other occasions disserves, the national interest of Russia. For example, it has allowed Russia to assert its control of Crimea, which under international law was part of Ukraine. This means Russia now directly controls grain production in the Crimea and has unimpeded use of Crimea's ports. Moreover, it has allowed Russia to disrupt grain production in eastern Ukraine, noting that Ukrainian grain exports directly compete against Russian grain exports. Lastly, by militarily supporting the Assad regime in Syria, Russian grain exports will increasingly flow to Syria, especially if the Syrian war ends to the advantage of the Assad regime. In addition, closer trade ties with Iran are being formed as the Shi'a religious base in Iran opposes the Sunni-based forces active in neighbouring Syria. However, so far one unanticipated consequence of support for the Assad regime has been border incidents between Russia and Turkey that have jeopardised Russia's trade with Turkey.

8 Strengths, weaknesses, opportunities, threats.

The militaristic stance of Russia, however, is not without some substantial adverse ramifications. Firstly, the Russian occupation of Crimea and its subsequent involvement in the conflict in eastern Ukraine have led several Western nations to impose economically harmful sanctions against Russia. In retaliation, Russia has imposed import bans on many agricultural imports from those countries, but this has fuelled cost inflation in Russia and made its population worse off. Moreover, Western nations have provided additional support for Ukraine, which includes funding to improve the cost-efficiency of Ukraine's grain sector, thereby adding to competitive pressures on Russian grain exports.

Often the interests of any region or sector, including the grains industry, are subservient to the emphasis the Russian government places on geopolitics and food security. At various times, market forces alone are not the main determinant of change in Russia. Rather it is the policy decisions of the Russian government that can leave short-term and longer imprints on regional growth and the profitability of various sectors, including the grains sector.

The power of the Russian government and its willingness to exercise that power are potentially both strengths and weaknesses for Russia's grains industry. It means, via the edict and support of the Russian government, rapid structural change, either growth or curtailment, is possible in Russia's grains industry.

3. Reorganisation of science institutions

An illustration of the role and power of government in affecting key institutions and sectors is the Russian government's response to the science sector. Russia has a rich history of scientific achievement and several of its scientific organisations are internationally held in high regard. However, occasionally in the business of science, organisational renewal and restructure are needed to deliver cost efficiencies and better outcomes. President Putin's 2013 decision to force greater accountability on the RAS regarding outcomes from its US$1.9bn annual budget could spawn many desirable changes. Grain production might ultimately benefit from these changes.

Conversely, as can also be the case with institutional re-organisation, funding and career uncertainty can lead to staff dissatisfaction, loss of morale and loss of key staff who seek more secure employment elsewhere. It is too early to know the outcomes of the re-organisation of Russia's science institutions. Is it proving a worthwhile path to improvement or are the adjustment costs impeding any progress? This is yet another illustration of the power of the Russian government and its willingness to exercise that power which may prove a strength or a weakness for Russia's grains industry.

Strengths

Russia is blessed with many advantages that strengthen its position as a wheat exporter:

- Russian wheat production is in close proximity to Egypt and Turkey — two of the world's largest wheat importing markets.
- There is ample arable land — Russia possesses almost 10 per cent of the world's arable land (122m ha)[9].
- A large proportion of Russia's wheat production comes from regions adjacent to several Black Sea ports.
- Grain land freight costs in Russia are not too high as most grain is transported by trucks over short haul distances.
- Russian grain production is increasingly dominated by large, vertically-integrated agroholdings using state-of-the-art agricultural production techniques and equipment, enabling efficient production of high-quality grain.
- A range of government programs, including subsidies on inputs and interest rates, supports grain production in Russia.
- Increased upgrade of, and additional investment in, grain storage and port infrastructure in Russia will accommodate larger crops.
- Russian ports are a mixture of deep-water ports, which can load panamax and handymax vessels for distant markets, and shallow-water ports on the Sea of Azov, which can load smaller coasters to ship small parcels economically to closer markets in the Mediterranean. These shallower ports also give buyers the ability to target specific quality wheat in smaller parcels.
- Up-country storage in Russia is a usable mix of public elevators and on-farm storage.
- Compared with the EU, Australia and North America, Russia has relatively low agricultural land values and a low cost of grain production.
- Medium-protein hard wheat produced in Russia is ideally suited to Middle-Eastern flat breads, creating a useful synergy with the country's proximity to these markets.
- The recent weakness in the rouble ensures FOB grain prices make grain production relatively profitable in Russia.

9 Australia — 47 million hectares.

Weaknesses

Despite its strength, there are weaknesses in Russia's grains industry:

- The Black Sea is Russia's only viable outlet for exporting large volumes of grain. Any effort to export wheat produced in Siberia means a 4800km journey west to the Black Sea or the same distance east to Vladivostok. Grain produced away from the Black Sea is therefore steeply discounted in view of the costs involved in bringing it to port.
- Russian wheat has a relatively poor reputation for producing Western-style breads and Asian noodles, so there is little chance of displacing DNS, CWRS, APH and even HRW in premium Asian markets.
- As Russia will always give priority to the availability of affordable food for its citizens, it is unable to use stability of supply as a selling point. Countries with delicately-balanced food security will always be reticent to base their wheat importation requirements on unstable Russian supply.
- Russia's wheat customers tend to be some of the world's most price-driven markets, creating few avenues for the extraction of premiums for quality.
- Many small-to-medium-sized farms in Russia are forced sellers of their grain. Inadequate and inferior on-farm grain storage, price inflation and inability to access price risk management tools force many farmers to sell at or near harvest.

Opportunities

A range of opportunities exists for Russia's grains industry:

- Gradual improvements in logistics infrastructure should make grain production economically viable in arable lands more distant from the nearest export terminal. The potential exists to eventually unlock massive tracts of agricultural land for grain production.
- The border shared with China will increasingly create opportunities for cross-border trade out of Siberia and other parts of the country without proximity to ports.
- A weak rouble means foreign investors are especially incentivised to invest in Russian grain production. The returns are more likely to be sufficient to overcome sovereign risk issues.
- Projected climate change may create large swathes of newly arable land in Russia.
- President Putin's decision and actions to restructure the public institutions responsible for science in Russia are likely to improve the efficiency and outcomes of research in Russia. Grain production will ultimately benefit from improvements in the organisation of agricultural science in Russia. For example, better-quality varieties with improved yields are likely.

Threats

Despite the clear opportunities, there are some significant threats, which could impact Russia's grains industry:

- Ukraine's increasingly close relationship with its EU neighbours gives it an advantage over Russian wheat in terms of tariff treatment into certain EU markets. This is exacerbated by Russia's deteriorating relationship with Western Europe, which has the potential to impact wheat supply via trade embargoes or other retaliatory measures.
- Economic deterioration in Russia, and political instability in countries bordering Russia, reduce the attractiveness of Russia as a target for grain-based foreign investment. The marked devaluation of the rouble since 2014 has made imported grain production inputs and machinery more expensive. Furthermore, local demand for grain and grain-based products is subdued due to a decline in consumers' real incomes.
- Although the ongoing restructure of the publicly-funded science system in Russia could deliver benefits, it is not without risks, such as the loss of younger scientists in search of greater security and remuneration.

Implications for Australian wheat exports

Key markets

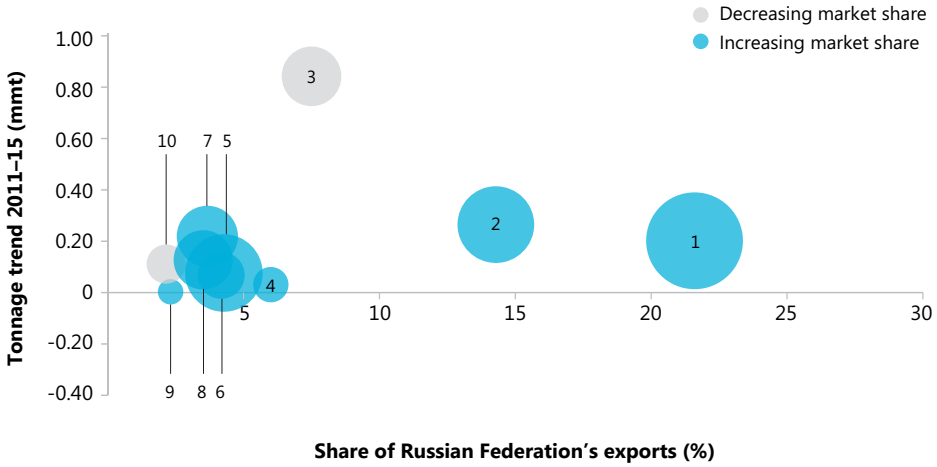
Russia and Australia both have key markets for their wheat exports (Figure 40 and Figure 41). For Russia those markets are Egypt and Turkey, whereas Australia's main market is Indonesia. Neither Russia nor Australia share the same country as a major destination for their wheat exports. In fact, when the lists of each country's top-10 destinations are compared, there is no overlap, based on the period 2011–15.

On first glance it appears there is no direct competition between Russian and Australian wheat — each country principally exports wheat to nearby countries and has different key export outlets. However, there are some concerning trends for Australian wheat exporters.

Firstly, and of most serious concern, is that Australia's share of wheat imported into most countries on Australia's top-10 list is falling, as shown by the dominance of grey bubbles in Figure 41. By contrast, Russia's share of wheat imported into most countries on Russia's top-10 list is rising, as shown by the dominance of blue bubbles in Figure 40. The implication of the increased role played by Russian wheat in many wheat markets is that if Russian wheat export growth continues to outstrip that of Australia, then eventually Russian wheat is likely to displace Australian wheat, even in markets currently on Australia's list of top-10 importers. Evidence is already emerging of this displacement commencing in markets such as Indonesia. Moreover, even if Russian wheat does not directly compete against Australian wheat, it is possible wheat of other origins (e.g. Canada, EU, USA) displaced from markets due to Russia's increased market share could then find its way onto markets principally or partially served by Australian exporters.

In short, the emergence of Russian wheat exports is likely to have direct and indirect consequences for Australian wheat exporters.

Secondly, some markets on Australia's list of top-10 destinations for its wheat display a downward trend in the volume of wheat purchased (e.g. Japan and South Korea). Population and/or income effects are lessening wheat purchases in those countries. Russia is not exposed to those markets, although most of the markets serviced by Russia are markets subject to moderate growth in wheat imports

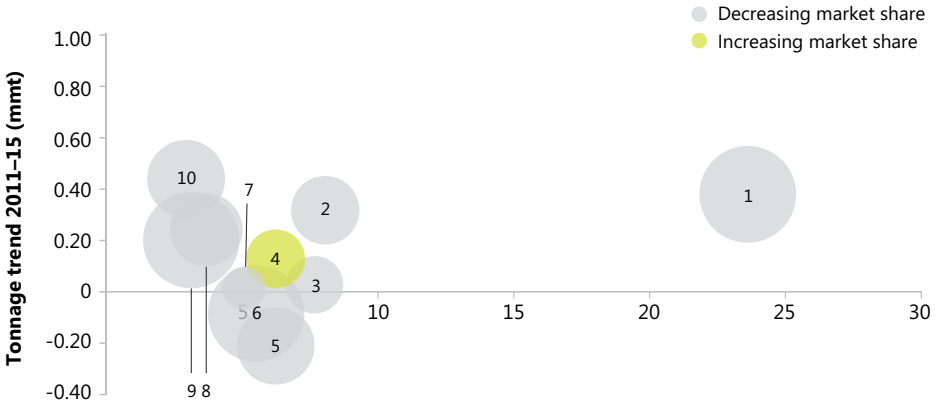


Legend for bubble numbering and size of market

1	Egypt	4.53mmt	**6**	South Africa	0.88mmt
2	Turkey	3.07mmt	**7**	Bangladesh	0.89mmt
3	Iran	1.51mmt	**8**	Yemen	0.67mmt
4	Azerbaijan	1.23mmt	**9**	Georgia	0.49mmt
5	Nigeria	0.87mmt	**10**	Kenya	0.48mmt

Figure 40 Wheat market opportunities for Russia — size of market (bubbles), growth in market (Y-axis), share of Russian exports (X-axis) and change in market share (colour)

Source: Trademap, 2016, USDA 2016



Legend for bubble numbers and size of market

1	Indonesia	4.16mmt	**6**	Japan	0.88mmt
2	China	1.38mmt	**7**	Malaysia	0.89mmt
3	Vietnam	1.31mmt	**8**	Philippines	0.66mmt
4	Yemen	1.09mmt	**9**	Egypt	0.47mmt
5	South Korea	1.05mmt	**10**	Thailand	0.47mmt

Figure 41 Wheat market opportunities for Australia — size of market (bubbles), growth in market (Y-axis), share of Australian exports (X-axis), change in market share (colour)

Source: Trademap, 2016, USDA 2016

(0.10 to 0.20mmt per annum). By contrast, more of the markets on Australia's top-10 list are markets growing more strongly (>0.20mmt per annum), although Australia's share of that growth is lessening.

It is important to think through the nature and implications of these findings. Firstly, the markets principally serviced by Russia are mostly price-sensitive markets (e.g. Egypt, Turkey) with moderate growth rates. By contrast, Australia is more exposed to markets growing more strongly and some of those markets are less price-sensitive, albeit Australia's share in many of the faster-growing markets is lessening.

In the short term the implication is that Australia is not necessarily at a marked disadvantage, due to the growth in those nearby markets, as shown in Figure 41. However, the fact Russian wheat is often preferred in Egypt's GASC tenders reflects Russia's low cost of production and lesser freight costs relative to wheat exported from other origins, such as Australia.

Export growth

Figure 42 compares the growth in exports from Russia and Australia, with the growth of consumption and imports in each of the country's top-10 markets respectively.

The export growth from Russia outstrips the consumption growth in each of its top-10 markets, let alone the import growth, whereas the growth in Australian exports does not meet the additional demand for grain in its top markets.

The implication is that Australia can, in the short-term, benefit from increased demand for wheat in its nearby markets, in spite of losing some market share. However, in the medium term, if affordable and increasing volumes of wheat exports emanate from Russia and its Black Sea neighbours, and some of this volume increasingly enters Australia's main wheat markets, then eventually Australia's declining market share will affect the value and size of Australia's wheat industry.

Already Russian authorities have signalled that towards 2030 they see Morocco, Indonesia, Philippines, South Korea, China and Algeria as prospective buyers of their wheat. Some of those countries are currently main markets for Australian wheat.

Yield and production trends

The difference in wheat yield trends between Russia and Australia is of concern. During the period 2000–15, when Russian agriculture received additional government support and private investment increased, and plantings of higher-yielding winter wheat occurred, average wheat yields in Russia increased by 1.8 per cent per annum. By contrast, during the same period Australian wheat yields only increased on average by 1.3 per cent per annum. Yet, as previously discussed, there are major deficiencies and impediments to wheat breeding and the purchase of some production inputs in Russia compared with the situation in Australia. Nonetheless, in spite of those weaknesses the Russian wheat industry has improved its wheat yields at a greater rate than has the Australian wheat

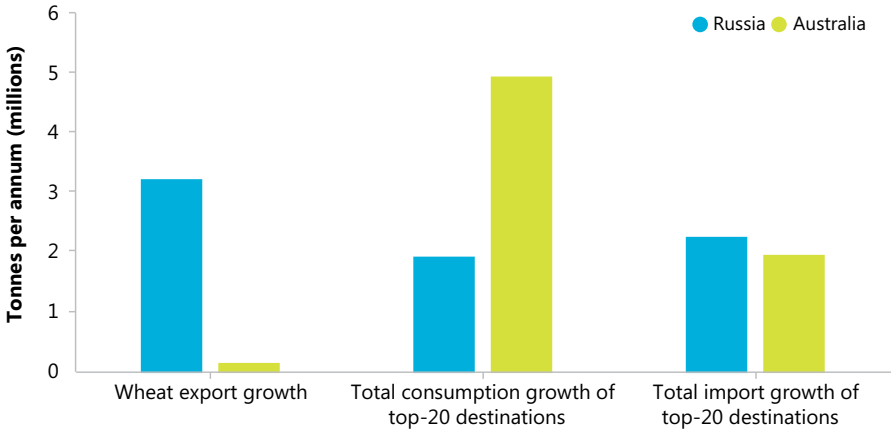


Figure 42 Comparison of consumption and import growth in each of Australia's and Russia's top-20 wheat export destinations, and the growth of exports from each country

Source: USDA

industry. If these yield trends continue, then wheat yields will increasingly diverge between Russia and Australia.

An implication of this phenomenon is that provided there are no offsetting shifts in areas planted to wheat, then increasingly greater volumes of wheat from Russia will be available for export to some of the same markets currently serviced by Australia. Furthermore, it is projected global changes in climate are more likely to facilitate grain production in wheat-growing regions, such as Russia and Canada, relative to grain-exporting regions, such as southern Australia, which is subject to a drying trend.

Such spatially different changes in climate worsen the outlook for Australian wheat exports relative to the more positive trends possible in Russia and Canada. The fact Russian grain exports are projected to increase by 60 per cent between 2015 and 2030 means larger volumes of grain will be carried on Russia's rail system and will pass through its port terminals. This greater throughput of grain will help lower the unit cost of transport and handling in Russia and further underpin the international competitiveness of Russian grain.

Australia is not facing the same increases in volumes of grain exports. Therefore, Australia is unlikely to reap the same cost-savings from its logistics and handling infrastructure.

Wheat quality

One offsetting advantage favouring Australian wheat in some less price-conscious markets is the functional advantage of Australian wheat over Russian wheat for noodle making.

Japanese udon and ramen noodles are two products for which Russian wheat has a low probability of market uptake, whereas the prospects are greater for use of Russian wheat in the price-sensitive segment of the SEA baking market.

While the best Russian wheat typically lacks the extensibility needed for high-quality noodles, its baking properties can sometimes range from ASW-equivalent to even APW-equivalent. For Russian wheat to more deeply penetrate the higher-priced market segments in South East Asia will require either a targeted breeding program in Russia or a price spread between Russian and Australian wheats wider than the current premium the market is willing to pay for the functional advantages of Australian wheat.

Russia's modernisation of its supply chain is allowing greater scope for targeting specific niches in Australian wheat export markets, or markets with more stringent demands around functionality or parcel sizes. This is enhanced by a growing understanding in SEA markets of the milling properties of Russian wheat, enabling millers to push up its inclusion rate. This trend appears set to continue for at least the next five years. However, this process of acceptance may not be uniform. Certain markets (such as Indonesia) are likely to increase their purchases of Russian wheat, whereas other markets (such as Japan or South Korea) are less likely to buy Russian wheat for milling in the short to medium term.

The functional advantages of Australian wheat, cannot alone prevent Russian wheat from making further inroads into Australia's SEA markets, as evidenced by the growth in Russian, Ukrainian and Argentinian imports in recent years. In these markets, Russia is capturing a growing portion of the price-sensitive, less-quality-conscious market segments where, along with Ukrainian and Indian wheat, Russian wheat is used to bring down gristing costs. Hence, Australia's historical ASW and GP exports are becoming increasingly imperilled, although growing evidence suggests even APW market share is being lost to cheaper alternatives. By illustration, Australian wheat has been priced out of Indonesia for much of 2016 and Argentinian wheat has emerged to complement and even overtake Russia as a major supplier to Indonesia. Until the global market has an opportunity to erode record global stocks of wheat, it will remain unclear how long lasting will be this recently observed change in market shares in South East Asia.

Freight differentials, along with undemanding quality requirements, are such that Russia enjoys a powerful competitive advantage in the MENA region. Hence, Australian recovery of market share in many MENA markets appears unlikely.

By contrast, with its need for extensible wheat and balanced dough properties, the SEA market can support a finite premium for Australian wheat. However, this advantage is thinning, resulting in Australian wheat being priced out of this market from time to time.

In the particular case of noodles, their production is less forgiving of quality shortcomings than traditional MENA staples, such as flat breads. The extensibility of Australian wheat for noodle production creates a natural barrier to entry, which protects market share to some degree — although this barrier is not substantial.

Supplier reliability

While Russia has gradually been earning its reputation as a supplier of cheap, functionally-acceptable wheat, nonetheless the Russian government's wheat export bans during the past decade have tarnished Russia's reputation as a stable supplier.

Although price-conscious buyers have pragmatically short memories, the risk of supply disruption does make many buyers in South East Asia wary of basing too much of their overall program around Russian wheat. While Japan's famously precarious food security situation is well known, countries such as Indonesia are equally mindful of the gaps in their self-sufficiency and their consequent reliance on imported grains. However, for buyers like Egypt, their need for large volumes of cheap, imported wheat affords them little alternative but to mostly leave their fate to Russian politicians.

Russia's history of infrequent bans on wheat exports may not necessarily extend into future years. Rather, the prospect of further export bans is more likely to diminish. There is already a growing realisation among Russian government officials and other industry personnel that the previous temporary restrictions on wheat exports were a blunt instrument with some undesirable consequences. Russia's drive towards food security, self-sufficiency and its diversification away from continued main dependence on energy exports is likely to see it avoid wheat export bans in the future. The government is more likely to use alternative policy measures to control domestic food inflation; and this will give millers in MENA and South East Asia more comfort when purchasing Russian wheat.

Responses and actions for Australia

Compared with South East Asian demand, the occasionally large volume of Australian wheat historically been imported by MENA countries will remain at risk of being crowded out by Russian and Ukrainian exports. Many MENA markets are growing more slowly than Asian markets and so price-preferred Black Sea wheat can rapidly displace Australian wheat in those markets.

Conversely, the more-rapidly-growing Asian markets are more likely to continue to accept Australian and Black Sea wheat, even though Australia's market share in some of those Asian markets could be gradually diluted.

With this rising tide of Russian and Ukrainian wheat flowing in the direction of Australia's export markets, what are useful responses or actions by the Australian grains industry?

1. Keep committing to Research & Development for farm-level innovation that drives down the unit cost of wheat production.

A first competitive response of Australia is to ensure, to the degree it is possible, Australian wheat is affordable. Although the Australian wheat industry is relatively powerless to affect the exchange rate for the AUD it can act to increase the productivity of wheat production, thereby lowering the unit cost of wheat. Hence, committing to R&D that delivers farm-level innovations that drive down the unit cost of production is essential.

Some fiscally imperilled governments in Australia have lessened their commitment to agricultural R&D. In spite of the language of innovation, nation-building and supporting international competitiveness, the evidence in some grain-producing regions is that restricted funding by government is impeding grains industry productivity growth. Yet insights and innovation from R&D are essential to maintain the export competitiveness of Australian grain.

2. Quicken the pace at which supply chain infrastructure is upgraded and rationalised, to drive down supply chain costs.

Another facet of ensuring Australian wheat is affordable is to ensure Australia's grain supply chains operate cost-effectively. Supply chain costs are about 30 per cent of the total cost of grain production for Australian growers. Key organisations within grain supply chains must compete yet also collaborate to deliver cost efficient services. The upgrade, rationalisation and unleashing of competitive pressure and cooperation in supply chains is needed to drive down their overall unit costs.

3. Monitor and report the strategic importance of changes in the Black Sea region that affect grain markets.

Global market conditions are dynamic in nature so it remains important to ensure the Australian grains industry is well informed about developments in Russia and its Black Sea neighbours. Grain production from this region will form a larger share of the international wheat trade, so there is an increased likelihood the region will affect grain markets. Hence, any changes that affect grain markets in the region need to be monitored and reported to the Australian grains industry. Being forewarned of Black Sea strategic changes provides the Australian industry with time to respond appropriately.

4. Sustainably fund and coordinate intelligence about the requirements end users have for Australian wheat so we can provide a product they value more.

Industry will and leadership — and a degree of inventiveness — is required to ensure these activities occur. If we know what our customers want and value, we can better serve their needs. Australia's North American competitors are already better at funding and coordinating their servicing of Asian customers.

Australia currently lacks a coordinating organisation that could collect such end-user intelligence, and demonstrate and communicate the benefits of Australian wheat to those end-users. By contrast, Canadian wheat growers and exporters are well served by the Canadian International Grains Institute (CIGI), which not only provides training and education services for end-users of Canadian grains but also regularly undertakes, in collaboration with Canadian farmers and wheat exporters, marketing tours within countries that are outlets for Canadian grain. Similarly, the US Wheat Associates has an extensive and persistent program of provision of technical support to end-users of US wheat and regularly hosts marketing events for US wheat. Furthermore, French cereal farmers and exporters are assisted by Export Céréales with centres in Beijing, Casablanca, Algiers and Cairo. The mission of Export Céréales is to retain existing customers of French cereals and to open new markets. Staff of Export Céréales identify market opportunities and promote the advantages of using French cereals.

Similarly, CIGI regularly interacts with end-users and gathers intelligence about end-user preferences and market trends. White *et al* (2015) comment about CIGI, saying;

> *"The Canadian International Grains Institute (CIGI) co-ordinates market support for the export of Canadian grain. During its 42 years of operation more than 39,000 people have participated in CIGI's programs, 14,000 of whom are in Australia's strategic Asian markets. This represents a vast alumni of grain processing staff skilled and familiar in the use of Canadian grain, and supported through ongoing contact. The Australian grains industry does not have a similar program to support the use of its grain. Australian grain customers in Asia have noted the lack of an Australian equivalent to CIGI and CIGI take advantage of this fact". (p8)*

Hence, Australian wheat faces not only price competition from Russian wheat, but also institutional competition from Canada, France and the USA.

Australia may not be well placed to match additional price competition from Russian wheat, but it certainly could commit to re-dressing institutional competition by forming and supporting an organisation that understands and promotes the qualities of Australian wheat for which end-users are either prepared to pay a premium for, or for which blend inclusion remains important. It is worth noting that Russia currently perceives one of its strategic weaknesses is its insufficient support for the promotion of Russian grain and its products on the world market. It is sobering to note that Russia, as one of Australia's emerging competitors, already acknowledges its need to better promote and market its grain, yet the Australian wheat industry remains unconvinced that the marketing and promotion of its wheat is a current source of inadequacy.

Just as the Australian grains industry has committed to investments in supply chain infrastructure, we suggest that further investment in information infrastructure is required. Gathering market intelligence and demonstrating to end-users how they can best extract value from use of Australian grain are key aspects of such an investment in information infrastructure.

Another important aspect of better serving end-user needs would be to further capitalise on the effectiveness of Australia's end-point royalty (EPR) system, which supports wheat breeding (Kingwell and Watson, 1998; Kingwell, 2001; Kingwell, 2005).

The organisation of wheat breeding in Australia is somewhat unique on the global stage, due to its reliance on 'end point' rather than 'seed' royalties as the principal source of revenue for breeders. Accordingly, breeders are strongly incentivised to ensure their varieties are widely grown.

To achieve adoption of their varieties a breeder must ensure each variety firstly is high yielding and secondly, receives a quality grading that attracts a high price. Although the achievement of high yield is unambiguously beneficial for wheat growers and breeders, the price signal between end-user requirements, wheat grading and required quality traits in a wheat variety is less clear.

To support targeted market differentiation, underpinned by aligned wheat breeding, there is a need to gather more intelligence about the specific characteristics of wheat different markets value highly, or different end-users require. Wheat breeders and those engaged in wheat variety classification use such intelligence to ensure varieties offered to and grown by Australian farmers have traits that not only benefit the growers, but which serve end-users' needs. Committing to being responsive to end-users will enhance the reputation of Australian wheat and ensure Australia's market share and price premiums are less susceptible to erosion.

Note that this is a not a strategy of niche marketing but rather a strategy of greater investment in information infrastructure. Enlarging and coordinating intelligence-gathering regarding market segments, new markets and end-user preferences facilitates the Australian wheat industry to better serve its current and future customers.

Such market responsiveness, however, is not the sole responsibility of wheat breeders. Rather it requires an integrated strategic commitment by the main stakeholders in Australia's wheat industry. For example, for breeding companies to commit to breeding varieties with particular

qualities suited to end-users' needs requires a commercially attractive route to market. If existing grain handlers and exporters are not prepared to accommodate or help design such a pathway to market, or have no mechanism to adequately share in the value of that market transaction then such quality-focused developments are unlikely to succeed. In addition, even when a new variety is developed with superior quality traits, end-users need to demonstrate and verify the utility of the variety in order to form and underpin any price premium or greater rate of inclusion in blend ratios.

5. Don't panic: ensure our actions are well-considered, coordinated and strategic.

The strong growth in demand for wheat in several of Australia's nearby markets ensures Australia has some time to respond to the mounting challenge from the Black Sea region, as export volumes into Asia from the Black Sea increase. It is as was pointed out in AEGIC's report on Ukraine; Australia faces a tide of grain, not a tidal wave of grain. In that sense, Australia has some time to respond and should not panic. However, the cost of failing to respond is also equally obvious, as a tide can wash over and on occasion remove that which is unprepared and motionless. Establishing exactly how Australia's wheat industry should respond needs to be underpinned by sound analyses of the ways in which Australian wheat is used and is valued in different markets or segments of markets in each Asian economy. Only through detailed and strategic analyses of these market opportunities is it possible to prioritise actions required of the Australian wheat industry.

Unlike many small-to-medium-sized grain farms in Russia, most Australian grain growers are rarely forced sellers. Australian growers have access to effective grain storage, complemented by a range of price risk management options so they can be more flexible and strategic about the way they sell grain. This is a source of competitive advantage to Australian grain growers. Australian growers, in general, do not need to panic or be forced to sell their grain.

This competitive advantage for Australian grain growers, however, will gradually be weakened as more Black Sea grain production comes from more farms gradually better equipped with upgraded on-farm storage and ability to use price risk management tools. The usefulness of these tools for Australian grain growers is revealed in farm survey data. For example, the top quartile of businesses regularly attain higher prices for their grain relative to other businesses, although over several years this differential is often less than AU$5 per tonne (Planfarm-Bankwest, 2016).

The challenges currently emanating from Russia and the rest of the Black Sea region are unlikely to dissipate. Moreover, already there appears to be emerging a separate new wave of smaller low-cost wheat producers from Romania and other Balkan countries. As these countries embrace modern crop technologies and become increasingly open to investment in their agricultural sectors and related supply chains, then additional competitive pressures will be unleashed. This competition will be additional to that already emerging from Argentina. In the period January to May 2016 Argentina exported around 2mmt to Indonesia, South Korea and Vietnam, with about one mmt of this going to Indonesia. Competition from Argentina will intensify during 2017 as the area planted to wheat in Argentina expands following removal of their wheat export taxes.

Despite Australia remaining a higher-cost source of wheat, nonetheless it will continue to display advantages from which it will benefit. Australia's domestic demand growth is modest. Hence, as Australian wheat yields increase, sizeable exportable surpluses will remain available to overseas wheat buyers. The reliability and ease of purchasing grain from Australia, and the fact that only Australia and Argentina are southern hemisphere main sources of wheat exports, ensures these origins offer risk-spreading advantages for countries such as Japan, Indonesia and China, who are prepared to pay for their food security by importing foodstuffs.

Furthermore, the regulatory and production methodologies applicable to Australian wheat provide food safety and resource sustainability credentials that could be a future influence upon wheat purchasing decisions in a few markets. All these strategic and long-lasting advantages add to the appeal of Australian wheat.

Right: Poster from 1948 portraying the vast potential in Soviet agriculture, "Seed on time – reap a mountain of grain".

Source: V.I. Govorkov http://sovietart.me


ПОСЕЕМ В ПОРУ –
СОБЕРЕМ ЗЕРНА ГОРУ!

Conclusion

Russian grain exports are projected to increase by 60 per cent from 2015–30. These exports are largely made up of wheat, sunflower oil, corn and barley. By 2030 Russia is forecast to export 32.5mmt of wheat, 9.7mmt of corn, 5.6mmt of barley and 0.5mmt of other grains.

Since the early 2000s, Russian grain production has increased greatly, such that now Russia is one of the world's top-ranked exporters of wheat, barley and sunflower oil. This considerable growth of trade has been attributable to a range of factors, several of which are likely to be enduring advantages.

Russia has sizeable areas of fertile, arable land and large nearby grain markets in Egypt, Turkey and other MENA countries. Russia's main southern grain-producing regions have ready access to nearby ports, ensuring their supply chain costs are far less than those in Canada or some inland parts of eastern Australia.

Russia's increase in grain production and grain exports has been supported by marked currency depreciation that seems set to continue for several years. In addition, since 2000 there has been a doubling of application rates of fertilisers on Russian grain crops and so yields have increased while crop areas (with the exception of barley) have also expanded somewhat. Hence most of the current and projected increase in grain production stems from greater intensification rather than expansion of grain production into marginal areas.

Russia's growth in wheat exports, mostly based on intensification, will stimulate further investment in supply chain infrastructure, resulting in a lower unit cost of rail and port infrastructure services due to greater throughput of grain and a greater proportion of grain being moved by rail. The supply chain costs from Russia's main wheat export regions form 31 per cent of its FOB wheat prices. During 2016, Russia's supply chain costs for wheat are estimated to be ~AU$56 per tonne and farm costs of export wheat production are ~AU$121 per tonne. These costs ensure Russia is one of the cheapest origins of wheat exports.

By comparison with other major wheat-exporting countries, apart from Australia, Russian wheat yields are relatively low, ~2t/ha on average. Although increased use of fertilisers has lifted these yields, the economic and political turbulence since the collapse of oil prices during late 2014 is affecting the Russian government's ability to invest more in grains R&D that will further boost grain yields. The Russian government does see the grains sector as an economic growth opportunity, but it is fiscally constrained in how it can further support grains R&D, supply chain infrastructure investment and organisational reform in the grains industry. In comparison to other major grain-exporting nations, Russia's quality and magnitude of its grains industry R&D is low, although its science institutions are being re-organised to be more effective.

Political decisions can greatly affect many aspects of Russia's economic and social life, and grain production and export are not immune. The policies and actions of the Russian government over the past decade or so reveal its desire to improve Russia's food self-sufficiency, food security and food affordability. For example, greater production of feed grains, taxes on grain exports and recent bans on the import of livestock products from the EU and other Western nations is supporting recovery of livestock production in Russia.

Russia's projected growth in grain production will ensure the impact of drought on Russia's stable population could be less frequent and government wheat export bans, at least for food security, should occur less often.

Implications for Australia's wheat industry

Australia and Russia have different top-20 wheat customers and therefore seemingly compete in different markets. However, Russia is gradually exporting more wheat into Australia's key markets. Russia considers its future markets to include Morocco, Indonesia, Philippines, South Korea, China and Algeria; yet several of these are already principal markets for Australian wheat. Moreover, Russian wheat already enjoys acceptance as a suitable quality milling wheat in vital Australian markets, such as Indonesia.

As the quantity and quality of Russian wheat improves and the country's grain logistics network modernises, it should be assumed that Russian wheat will continue to gain acceptance by flour mills in Australia's key Asian markets. However, this process of acceptance may not be uniform. Certain markets (such as Indonesia) are likely to increase their purchases of Russian wheat, whereas other markets (such as Japan or South Korea) are less likely to buy Russian wheat for milling in the short to medium term.

Australia's market share in the MENA region is significantly more imperilled than its share in Asian markets, principally due to the relative freight advantage and the longevity and reliability of service Australia enjoys in some Asian markets. Many MENA markets are growing more slowly than Asian markets and so price-preferred Black Sea wheat can rapidly displace Australian wheat in those MENA markets. Conversely, the more rapidly-growing Asian markets can continue to accept Australian and Black Sea wheat, even though Australia's market share in some of those Asian markets is likely to be gradually diluted. The strong growth in demand for wheat in several of Australia's nearby Asian markets ensures Australia has some time to respond to the mounting challenge from Russia and its Black Sea neighbours.

As was pointed out in AEGIC's report on Ukraine; Australia faces a tide of grain, not a tidal wave of grain. In that sense, Australia has some time to respond. However, the cost of failing to respond is also equally obvious, as a tide can wash over and on occasion remove that which is unprepared and motionless.

Russia and its Black Sea neighbours form the most important wheat-exporting region in the globe, being responsible for about 30 per cent of global wheat exports. Hence, any changes in wheat production in the Black Sea region, due to climate, technology, politics or policy, have the capacity to greatly influence the international wheat trade, thereby directly or indirectly affecting Australian wheat exports. Hence, the Australian grains industry needs to be well informed about developments in the Black Sea region. Monitoring and reporting changes in the region that affect grain markets is essential for the commercial success of grain production and export for Australia.

The area of winter wheat in Russia is increasing and has now outstripped the area sown to spring wheat. Typically, winter wheat is higher yielding than spring wheat, which usually has higher protein content and is more suited to baking. Russia's production of spring and winter wheat causes a range of wheat qualities to be available in Russia. Better breeding, greater use of modern crop technologies and investment in improved grain storage should improve the quality of Russian wheat.

To ensure Australian wheat growers benefit from the growth in wheat demand in Asian markets, in spite of the enhanced competition from Black Sea and Argentinian wheat, there is a need for greater intelligence to be gathered about the specific characteristics of Australian wheat that are either highly valued in different markets or which are required by different end-users. Such information, if made available to Australian wheat breeders and those engaged in wheat variety classification, can ensure the varieties offered to and grown by Australian farmers have traits that not only benefit Australian wheat growers but which serve the needs of those end-users. Committing to responding to end-users will enhance the reputation of Australian wheat and ensure Australia's market share is less susceptible to erosion.

Lastly, Australian wheat faces not only price competition from Russian wheat but also institutional competition from Canada, France and the USA. Australia may not be well placed to match additional price competition from Russian wheat but it certainly could commit to re-dressing institutional competition by forming and supporting an organisation that understands and promotes the qualities of Australian wheat for which end-users are either prepared to pay a premium or for which blend inclusion remains important.

Russia currently perceives one of its strategic weaknesses is its insufficient support for the promotion of Russian grain and its products on the world market. It is sobering to note that while Russia already acknowledges its need to better promote and market its grain, the Australian wheat industry is yet to be convinced that a current source of its inadequacy is a lack of coordinated marketing and promotion of its wheat.

Poster from 1954 portraying the optimism within the Soviet agriculture, "Lets gather the rich harvest from the virgin land".
Source: O. M. Savostuk and B. A. Uspenskiy http://sovietart.me/

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