

techtalk

Growing hybrid rye

Today hybrid rye is grown on over five million hectares worldwide in Europe, Canada and the USA. KWS is actively developing market opportunities to support an increased acreage of this versatile, lower input crop. For the UK, KWS believes this highly productive cereal offers new perspectives for farmers and end users alike!



Rye not?

Interest in hybrid rye for grain is growing in the UK, not just because of its agronomic merits but also because it adds diversity to the rotation. Recent research demonstrates rye's benefits as a feed grain for pigs, opening up an expanding market opportunity for growers. CPM finds out more.

By Lucy de la Pasture

For many growers 2020 is a year where rotations are coming under real scrutiny. Finding crops to help lengthen the rotation has been on the agenda for a while but with oilseed rape now struggling to hold its place on some farms and increasingly stubborn weather patterns to contend with, it's now a top priority.

Plant breeder KWS believes hybrid rye could provide an answer to many rotational dilemmas so the company has actively been developing a market outlet that would support a significant increase in UK production. CPM talks to John Burgess, who looks after the KWS hybrid rye portfolio, about what the crop has to offer.

Why consider hybrid rye?

While a minor crop in the UK, rye has remained an important crop in Eastern Europe since it was first cultivated around 2,500 years ago and occupies approx five million ha worldwide. It has always been recognised for its drought tolerance and winter hardiness.

Rye was the first combinable cereal to be hybridized, with the first hybrids launched in the mid-1980s. Rye uses the modern CMS F1 technique, allowing breeders to systemise its seed production and modern hybrids use genetics originating from as far afield as Iran.

Owing to its relatively small global area, rye is not a species available from all cereal

breeders. Despite this hybrid rye travels remarkably well, so it's common to see the same variety grown from Russia to Denmark and in Canada and the USA. Because of this characteristic,

breeders don't need to support hundreds of varieties, as the same hybrid can be grown on different continents with remarkably similar grain quality. KWS in common with other



John Burgess says there's a growing interest in hybrid rye because of the benefits it can bring to the rotation.

“ Nitrogen inputs are far lower — 45% less than is required for a second wheat. ”

Growing hybrid rye: top tips

- **Consider rotational income** – and where grain rye could benefit yield performance the most
- **Consider soil type** – rye is well suited to light and acidic soil but not heavy clays due to the risk of slug damage
- **Plan to drill early** – keep seed rates around 175-200 seeds/m² and focus on PGRs for root anchorage and internode strength

In the last two seasons there's been increased uptake for grain production, with KWS reporting UK rye seed sales growing by 40%. The largest driver of growth has been for pig feeding as UK pig farmers become aware of the benefits from including rye in pig rations following its large uptake in Denmark, Germany, Poland and Spain. For pig producers, rye has welfare benefits as well as positive effects on gut health.

By contrast the Ryvita contract, which is limited to around 2000ha, has remained static, as has the area grown for a feedstock for AD plants.

Why is demand growing?

Artisan breads, specialist spirits and beers are growing markets that account for some of the increase in demand for rye grain. But the biggest growth area is in pig feed, where rye can be fed as pellets, or as wet or dry meal in home 'mill and mix' rations.

Rye grain is high in dietary



There's increasing demand for rye grain, with the biggest growth area as a feed for pigs.



Hybrid rye requires less water, nitrogen and fungicide inputs to produce 12t/ha grain yields.

fibre so promotes satiety, gut health and calm behaviour. This is especially important in finishers and sows as it leads to less tail biting and fighting over feed. As part of a finisher ration, rye can be included in the ration at up to 70%.

Arabinoxylan levels in rye far exceed wheat, which aids gut health by boosting gut microflora and reducing salmonella gut wall attachment. Because it demands more active chewing and saliva uptake, there's reduced feed acidity upon stomach entry, which leads to less gut ulceration.

Although the benefits of rye are now being recognised by the pig industry, there are constraints. About 50% of UK finishers are fed on pellets and compounders are currently set up only for wheat, barley, and imported maize. The remaining 50% is mill and mix where rations are far more adaptable, and this is where rye uptake is likely to be faster.

Why grow hybrid rye?

Yield and marketing options aside, hybrid rye has a host of agronomic qualities that make it an attractive crop to grow in the UK. It's much more drought tolerant than other cereals, using 25% less water/ha than winter wheat. That makes it ideal for free-draining, sandy or acidic soils of moderate fertility, as well as in regions where annual rainfall is less than 650mm.

Cranfield University has taken these criteria and identified a

total land area of approx. 300,000 ha, using its Land Information System (LandIS), which is most likely to suffer high soil moisture deficits during the late spring. (See orange key on map).

Land highly suitable for hybrid rye



Source: Developed by Cranfield LandIS for KWS, 2020.

What about agronomy?

Hybrid rye suits drilling in Sept, so fits into the rotation well and has the potential to help spread workload, with harvest generally falling after winter barley. Agronomically grain rye has similar phosphate and potash requirements to all winter cereals, but nitrogen inputs are far lower at 120-150kgN/ha — that's 45% less than is required for a second wheat.

KWS recommend a seed rate of 175-200 seeds/m² for Sept drilling, which is the optimum time, increasing to 220-250 seeds/m² going into Oct. Hybrid ▶

breeders made the decision to focus on hybrids and since the 1990s has made significant yield gains over 'conventional' rye, with modern hybrids now delivering grain yields in excess of 12t/ha. The hybridisation of rye has firmly suppressed ergot, which has been a historic weakness of rye, because of the pollination traits this has brought to modern varieties.

What's the market for grain rye?

Grown primarily for grain, rye can be used for both animal feed and for human consumption. As well as artisan breads, rye also has uses in brewing and distilling, whole crop silage production and more recently as a monogastric feed for pigs.

► rye looks fairly spartan during the winter but in the spring its vigour kicks in, producing up to 20 tillers/plant. Because of its prolific spring growth, hybrid rye offers good blackgrass suppression; shading it so that maturity is delayed, and less seed is shed — 60% of which has been found to be unviable.

To push grain yield, breeders have worked to increase the harvest index (or grains/ear) and have combined this with progressively shortening straw height and increasing internode strength. But as ears become heavier, the need to counter lodging risk means PGRs, such as prohexadione and trinexapac-ethyl, play a vital role.



For pig producers, rye has welfare benefits as well as positive effects on gut health.

Hybrid rye is a complementary crop to first wheat and barley in the rotation because of its disease profile. Rye is second only to oats in terms of take-all susceptibility, so doesn't need a specific take-all seed treatment. Although it can be affected by both septoria and ramularia, rye is a secondary host for both pathogens and has the capacity to outgrow early infections.

The two main diseases of importance are mildew (*Blumeria graminis*) in early spring (more important in Scotland) and brown rust (*Puccinia recondita*), which requires a fungicide programme to control. Fusarium head blight is much less of a problem than in wheat and studies have shown rye grain has lower DON values by comparison.

What are its other benefits?

In spite of modern hybrids being shorter and stiffer strawed, it's a tall crop and produces 30% more straw than barley or wheat, providing additional income. Rye straw is a useful commodity and is low in dust, making it especially suitable as a bedding material. Rye straw



Rye is normally ready to combine just after winter barley so helps spread the workload over harvest.

also provides pigs with a 'novel stimuli' and provides them with 'occupation' to relieve boredom and aggression in between feeding times.

Under the UK's new Agricultural Bill and the upcoming ELM scheme, farmers are likely to be rewarded for lowering their emissions but will ideally aim to deliver this without comprising yields. With a 45% reduction in nitrogen requirement compared with a second wheat and a significant saving on herbicide and fungicide inputs, hybrid rye could help achieve this. ■

Sponsor message

Ready for the future? Climate change, a growing world population and their resulting food needs present a challenge for agriculture. Together these require the industry to deliver more crops worldwide under increasingly difficult conditions, while using as few resources as possible — such as soil, water, nutrients and plant protection.

KWS Hybrid rye meets today's and tomorrow's requirements for a modern and high-yield crop. The future belongs to rye! #ryevolution

Rye promotes well-being

Former Pig Farmer of the Year, Steve Hart, gained the accolade because of the high welfare standards implemented at Norfolk Free Range. It was the welfare benefits of feeding rye that prompted his interest and he's been undertaking an assessment of how it could benefit the pigs on his farms.

Steve has 12 breeding units, housing 10,000 sows, and a further 30 farms which take his 80,000 growers to finish, of which 16,000 are housed indoors on straw and the vast majority are reared outdoors.

All the indoor pigs are fed on meal made from raw materials grown on the farm's 1100ha of arable land, which includes rye.

"Our nutritionist was keen to explore the well-being effects from inclusion of rye in the diet and to determine whether there were any negative

effects nutritionally. We've found rye can successfully replace wheat in the ration and has a calming effect on the pigs," explains Steve.

This effect is in line with Danish research, which indicates rye's relatively high fibre and fructan content is responsible. Nutritionists believe the complex carbohydrates degrade slowly and evenly in the small intestine to form glucose, which leads to lower and more even blood sugar levels which result in longer satiety.

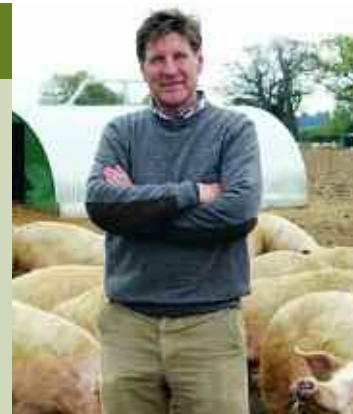
"Most fructans are digested in the hindgut so rye also stays in the hind gut for longer, filling the colon, so more water and nutrients are absorbed which leads to firmer dung. The pigs feel more comfortable so there are less problems with aggression."

One of the objectives in switching to a rye-based diet for the indoor pigs was to reduce the need for tail docking, a

measure taken to reduce tail biting. Steve is hopeful this will be the case but says it's still too early to draw firm conclusions.

Nutritionally there doesn't appear to be a drawback from feeding rye, he notes. "Liveweight gains are very similar to a wheat-based ration and its lower protein and starch content (approx. 2%) appears to be offset by the other benefits it offers."

This season the rye in the ground is looking good where other crops are suffering from the drought, notes Steve. Agronomically, he believes it has the potential to be more profitable than a second wheat and adds some diversity to the rotation. Steve is still exploring where rye fits best in his farming enterprise and intends to try some on his heavier fenland this autumn to see how it compares with the performance on the lighter land.



Steve Hart says rye produces similar liveweight gains to a wheat-based ration but also brings welfare benefit.

"The pig market for rye now needs to gain a critical mass so that there's enough demand from pig farmers for mainstream compounders to switch ingredients. They don't have the bin space for another raw bulk material but with less wheat in the ground this year, it could just be the opportunity rye needs for them to give it a go."

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