Hybrid Rye Development

KWS UK 2018/19
Presentation Contents:

- **UK Strategy**
  - Benefits for UK farmers
  - Ergot Resistance + PollenPlus®

- **End Markets & 2018 Portfolio**
  - Biogas
  - Feed Grain - Pig Finishing
  - Food Industry - Baking or Distilling

- **Expanding UK Acreage & 2018 Portfolio**

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> 2-3 Year focus;

- Expand rye in pig finishing diets
- Maintain leadership in AD
- Promote rye as a ‘heart healthy’ grain for food use
Rye – a multifunctional hybrid cereal
KWS - a long term player in rye breeding

Rye – the benefits of a hybrid cereal

- **Consistent** yield progression
- Extreme **winter hardiness**
- Superb **drought tolerance**
- **Growing acreage** in many cereal markets – EU, UK, USA, CANADA
- International development of the RYEBELT Project [www.ryebelt.com](http://www.ryebelt.com)
Hybrid Rye – benefits for UK farmers

Hybrid Rye - a place in UK rotations

- **High grain yields** of 10 – 13 t/ha exceeding 2nd wheat
- **Early harvest** (wholecrop) or grain (typically between winter barley and wheat)
- Ultra low **take – all carry over** (2nd lowest comp. to oats) *
- High **black grass suppression**
- High **straw yield** (around 30% higher than wheat or barley)
- Ideal option for **OSR establishment** to ensure volunteer control
Hybrid Rye – Ergot resistance through breeding
Ergot resistance through breeding

- **Ergot**
  - Infection > spores invade stigma at flowering
  - Effects outcrossing species (such as rye)
  - Also effects triticale, wheat & barley
  - Toxic to livestock and humans
  - Blackgrass is a common host

- **Breeding goal >**
  - Prevent ergot access to the stigma
  - Aim for 100% pollination
  - Obtain rapid pollination + closed stigma

**Ergot in grassweed infested fields**

Pictures from Wimpole, (Sadeik) Agrii & BCS trials, 2016
PollenPlus® - QTL marker selection

1. Identifying candidate lines

2. Marker selection

3. Ergot screening

- High speed line development
- Accurate screening + QTL
- Breeders eye

Normal pollen production

QTL selected - PollenPlus®
90% + 10% Pollinator v. 100% F1 Hybrid

Pictures from KWS trials, Duxford, 2016
Hybrid Rye for Biogas
Market Update - Biogas

UK Biogas Market

- ca. 270 on farm register AD installations active as of April 2018
- Total deployed capacity
  - Biomethane: 17,000 (Nm3)
  - CHP: 110,200 (kWe)
  - 55K. ha (1.2% of UK Arable)
- 20 Year CPI linked tariff
KWS UK Wholecrop Trials Data 2017
w/ Split N Rate GS 29 – 32  50 Kg/Ha N v. 80 Kg/Ha N Yield Responce

Data source; KWS UK Wholecrop Trials Data – 2017
Trial Drilled October 2016, Harvested June 2017
DM Yield adjusted to 35% DM expressed as Rel. %  Split N Rates applied between GS 29 - 32

Reference AD / Silage Hybrid
Reference Grain Hybrid (KWS DANIELLO)
Reference AD / Silage Hybrid (KWS PROGAS, KWS PROPOWER)
New Candidate Hybrid *Tested only in 2015 + 2016
### Hybrid Rye – Portfolio 2018

<table>
<thead>
<tr>
<th>Type (H = Hybrid)</th>
<th>Use</th>
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<tr>
<td>KWS PROPOWER</td>
<td>PollenPlus® - H</td>
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**Dedicated hybrid for AD**

- AD area stable
- Stiffer + less lodging v. KWS PROGAS
- Key competitors Helltop and SU Performer
- 100% UK seed production
Hybrid Rye for Feed Grain (Pigs)
Unique characteristics of rye grain

- **Higher lysine:protein ratio** in comparison to other cereals
- Low Glycemic Index (GI) and **high satiety**
- **Decreased gut ulceration**
  - High dietary fibre %
- Increased welfare + occupation & **reduced stress/boredom**
  (nipping, bruising, mounting etc..)

➤ **Home Mixing Pig Units**
- Reduced feed cost
- Higher welfare
Pig farming in the EU (sows by region) - higher use of rye as a feed grain (DK, DE, PL, NL)

Denmark case study…
Increasing use of Rye in Pig Rations

Rye - Food + Livestock Use 1995 - 2015

> Key drivers for rye feed use %
- Production efficiency
- Home feeding increasing
  - (Large finishing units w/ own arable cropping)
- Welfare benefits
- Agronomic benefits

Source: http://www.dst.dk/en/Statistik

KWS UK - HYBRID RYE UPDATE
Pig industry – UK Welfare post 2019

- **UK Farm assurance** in a global market

- **UK pork exports** v. domestic consumption

- Supermarket supply chains focus on **UK production** (Waitrose, Sainsbury's & Co-op)

- EU regulation on future **zinc oxide use** - & impact on **salmonella control** in piglets and finishing pigs
Hybrid Rye for Human Nutrition
Hybrid Rye - Key advantages for baking and food use:

- High **dietary fibre** content
- Stable glucose and **insulin** balance
- Rye has the lowest **Glycemic Index** (GI) values of all cereal grains
- Improve **bowel function** – lower risk of constipation
- Long term **cardiovascular health** – rye based diets are linked to decreased incidence of myocardial infarction & beneficial effects in **lipid metabolism**

Rye Grain
Stable insulin balance & heart healthy!

GI Index of Common Cereal Grains

- Rice (oryza sativa)
- Barley (hordeum vulgare L.)
- Maize (zea mays L.)
- Spelt (triticum spelta)
- Wheat (triticum aestivum)
- Oats (avena sativa)
- Rye (secale cereale)

KWS UK - HYBRID RYE UPDATE
Hybrid Rye - Example end use products:

- **Milling Products:** Whole grain rye, cut rye (steel), Malted rye kernels, Whole grain flour, Rye bread mix with sourdough, Rye bran, Rye flakes, Breakfast cereals (muesli, others)

- **Bread Products:** Sourdough rye bread, Crispbread, Thin crispbread, Rolls, buns and breads containing wheat/rye-mixture

- **Other Rye Products:** Rye porridge, pastries, Rye pasta, Snack products

- **Distilling:** Whisky production
Expanding UK Acreage

Data source; KWS UK Wholecrop Trials Data – 2017
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Hybrid Rye – Multi-Use Portfolio 2018

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Hybrid Rye – Agronomy and Breeder Efforts

- **BSPB:** Action on FSS Rye
- **AHDB:** KWS Entries for H18 Harvest
- **PGR:** Meddax Max & Canopy
- **Seed treatments:** *sedaxane* + others
Thank you for your attention.

www.kws-uk.com