

# Rye delivers sustainability

SEEDING  
THE FUTURE  
SINCE 1856

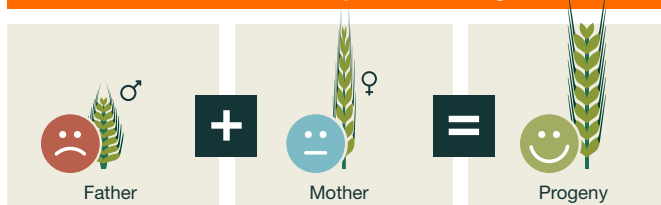


## 1 Yield progress

### KWS' continuous work on breeding progress



### The formula for success in hybrid breeding

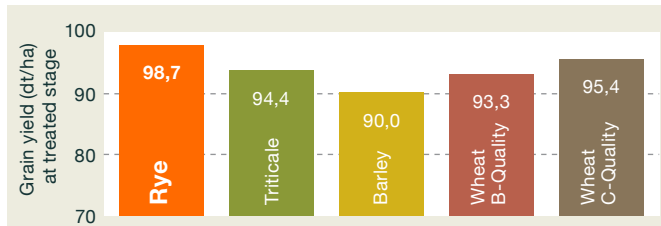


### Higher yield in hybrid breeding



### Highest yield among cereals

Comparison of cereals at the same official variety trial locations (LSV)



Results of the official variety trials 2011 – 2016, 93 locations

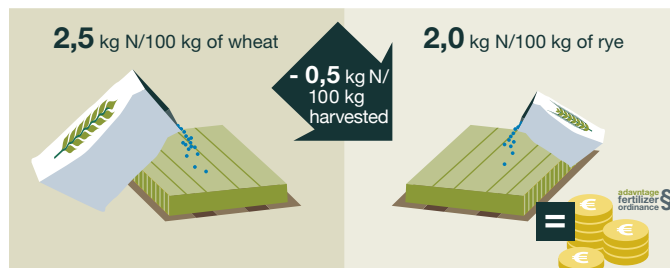
### Leap in yield since introduction of hybrid rye (1984)



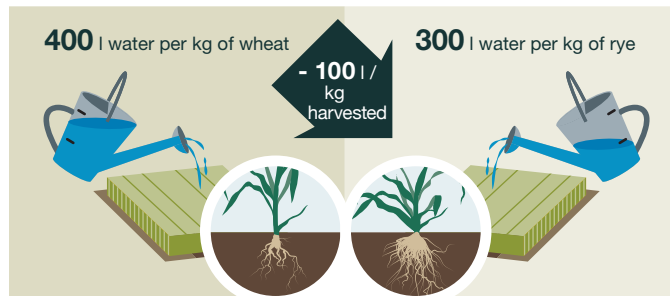
## 2 Sparing use of resources

### Wheat vs. Rye

#### Rye: lower nitrogen requirements



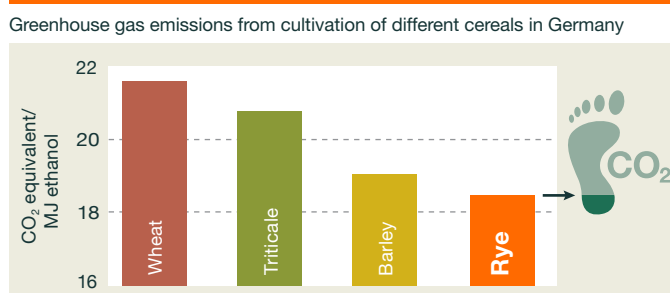
#### Rye: lower water requirements



#### Rye: less need for pesticides



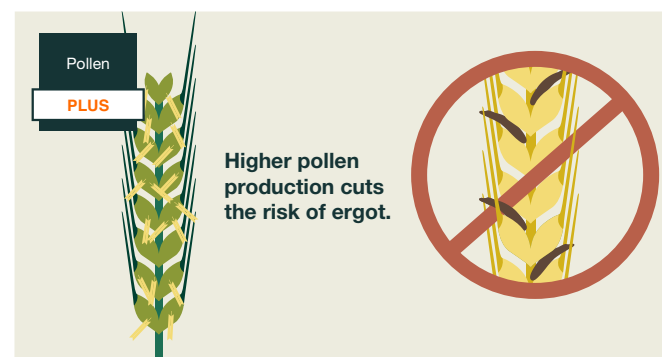
#### Rye: lowest CO<sub>2</sub> footprint among cereals



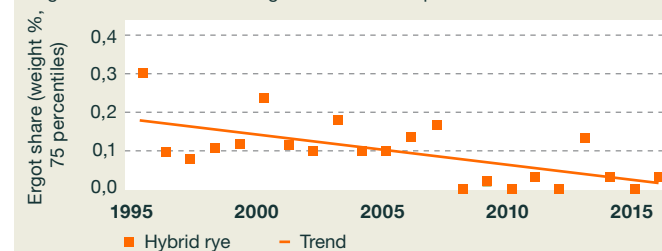
Germany 2016  
**575.200 ha**  
**3.190.000 t**  
**Ø 5,5 t/ha**  
(Destatis, 2017)

## 3 Raw material quality

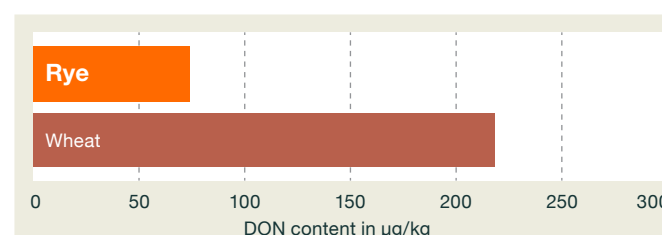
### POLLENPLUS® protects against ergot



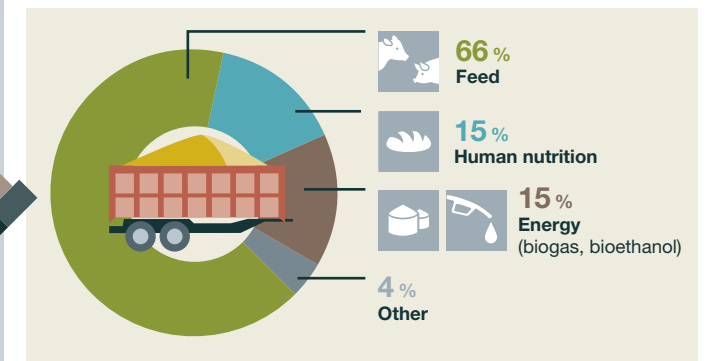
Ergot relative to the total weight of harvest samples



### Less risk from Fusarium



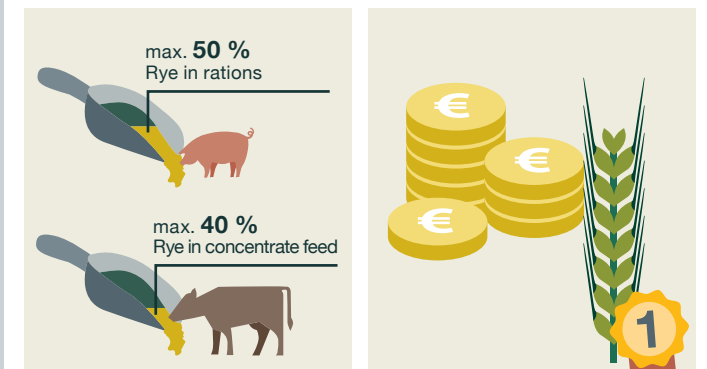
## 4 Possible uses



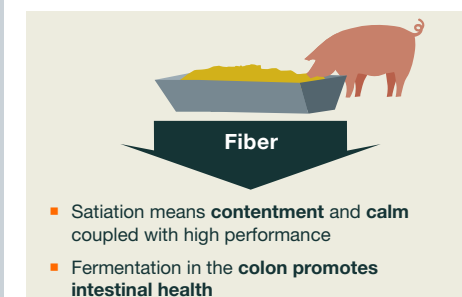
### Cut feed costs with rye

DLG recommendation on share of rye in feed

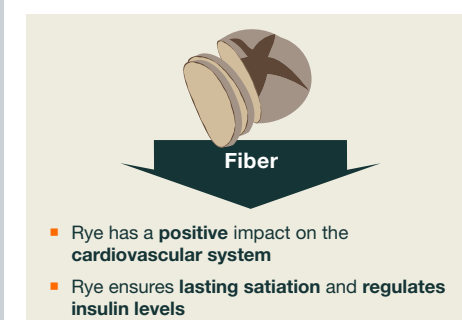
Higher cost-effectiveness by using rye



### Rye for animal welfare



### Rye for a healthy diet



1) Yield progress | The formula for success in hybrid breeding (own presentation based on Becker, 2011, and Longin, 2013); Higher yield in hybrid breeding (own allocation of the official trial results 2004 – 2016, KWS LOCHOW, 2017); Yield of the cereals (results of official variety trials (LSV) 2011 – 2016, 93 locations with LSV rye, LSV triticale, LSV barley and LSV wheat (B and C wheat), comparison of the averages for all tested varieties, results from Lower Saxony North Rhine-Westphalia and Schleswig-Holstein calculated from relative values, KWS LOCHOW, 2017); Leap in yield since introduction of hybrid rye (basis for calculation in the Descriptive Variety List (1980 – 1984) vs. (2012 – 2016); 1 loaf ± 1 kg of rye (i.m.a., 2011), 3.500 MJ per pig (LFL Bavaria, 2014))  
2) Sparing use of resources | Nitrogen requirements (draft Fertilizer Ordinance, Dec. 16, 2015, N uptake for wheat 2.51 kg/dt, N uptake for rye 1.96 kg/dt); Water requirements (Lower Saxony State Authority for Mining, Energy and Geology 2011); Need for pesticides (LFL contribution margins and calculation data, LFL Bavaria, 2016); CO<sub>2</sub> footprint (averages for the German NUTS 2 regions (BMEL, 2009))  
3) Raw material quality | POLLENPLUS® (KWS LOCHOW, 2017); Ergot relative to the total weight of harvest samples (MRI Detmold, Special Harvest Investigation 1995 – 2016); less risk from Fusarium (averages of the DON content in harvested wheat and rye 2006 – 2015, own presentation based on the figures from the Bavarian State Institute for Agriculture (KWS LOCHOW, 2017))  
4) Possible uses | (supply balance sheet for wheat 2014/2015, BLE, 2016); Cut feed costs with rye (DLG recommendation on share of rye in feed (DLG, 2006)); Rye for animal welfare (KWS LOCHOW, 2017); Rye for a healthy diet (www.ryeandhealth.org, 2017)