



OUTLOOK FOR CEREAL MARKETS IN EUROPE, NORTH AFRICA AND THE MIDDLE EAST WITH A FOCUS ON PROTEIN CONTENT AND MYCOTOXIN CONTAMINATION OF FEED STUFFS

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Budapest, 9 May 2017



OUTLINE

- Introduction
 - Definition of environmentally sustainable development
 - Sustainable development goals and FAO strategic objectives
- Outlook for cereals markets
 - Macroeconomic overview for cereals
 - Production, utilization, trade, stocks and protein content
- Cereals utilization for animal feed in Europe
- Fungi and mycotoxins
 - why and how; factors, impact of climate change
- Conclusions and recommendations



INTRODUCTION: SUSTAINABLE AGRICULTURE



FAO: “Sustainable development is the management and conservation of the natural resource base...

environmentally non-degrading,

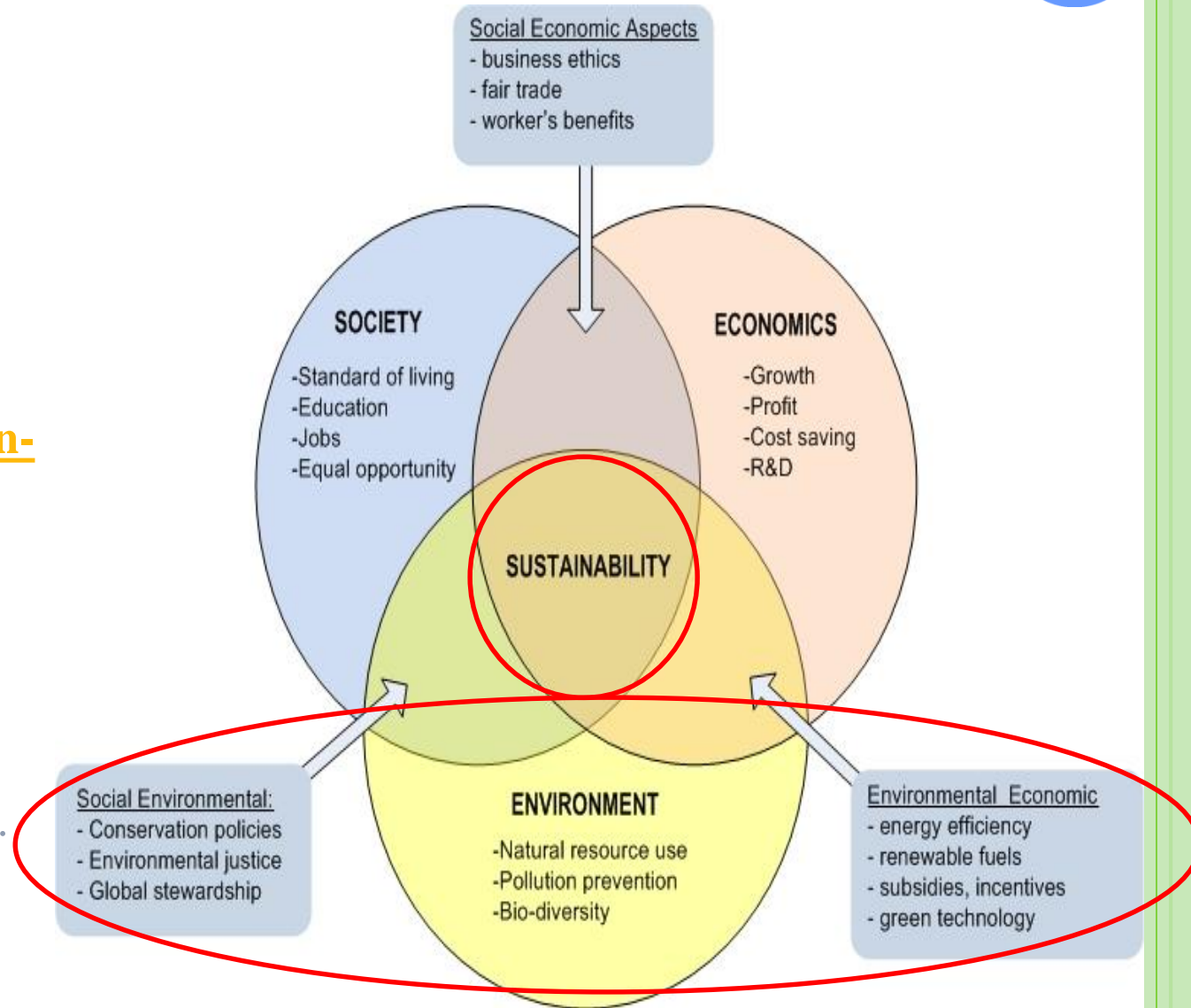
technically appropriate,

economically viable

and

socially acceptable”.

*FAO Sustainable agricultural resources development, SAFA; FAO Council, 1989. v. <http://www.fao.org>



ENVIRONMENTALLY SUSTAINABLE AGRICULTURE AND SUSTAINABLE DEVELOPMENT GOALS

- The current trends and challenges reflected in 17 SDGs* for the next 15 years to balancing economic, environmental, and social issues **
- Agriculture is focused on hunger and malnutrition (**SDG 2**), and closely linked to other SDGs: **SDG 1**, **SDG5** , **SDG6**, **SDG7**,**SDG 8**,**SDG 12**, **SDG 13**, **SDG15**
- The SDGs are linked to FAO Strategic Objectives***:
 - Help eliminate hunger, food insecurity and malnutrition
 - Make agriculture, forestry and fisheries more productive and sustainable
 - Reduce rural poverty
 - Enable inclusive and efficient agricultural and food systems



Increase the resilience of livelihoods to disasters

*SDGs - Sustainable Development Goals 17 Goals, to transform our world

** Sustainable Development Goals 17 Goals, to transform our world

<http://www.un.org/sustainabledevelopment/sustainable-development-goals>

***FAO Strategic Objectives, <http://www.fao.org/about/what-we-do/en/>



| SDGs | Total 17: Sustainable Development |
|---------|---|
| Goal 1 | End poverty in all its forms everywhere: 70 % of rural population is poor |
| Goal 2 | Zero Hunger |
| Goal 5 | Gender equality |
| Goal 6 | Clean water and sanitation |
| Goal 7 | Affordable and clean energy |
| Goal 8 | Decent work and economic growth |
| Goal 12 | Responsible production and consumption |
| Goal 13 | Climate action |
| Goal 15 | Life on land |

MACROECONOMIC AND ENVIRONMENTAL TRENDS

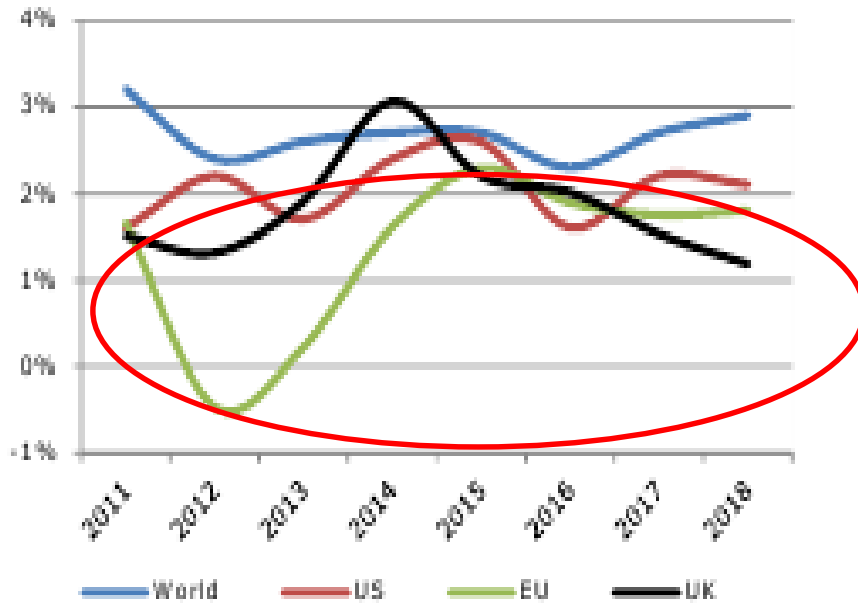
- Annual economic growth (%)***

World economic growth in 2016 (+2.3%), less volatile**

Prospects for 2017 & 2018: +2.7% & +2.9%

European economic growth (+1.7%) below average world growth and more volatile.

Prospects for 2017 & 2018: +1.5% & +1.4%



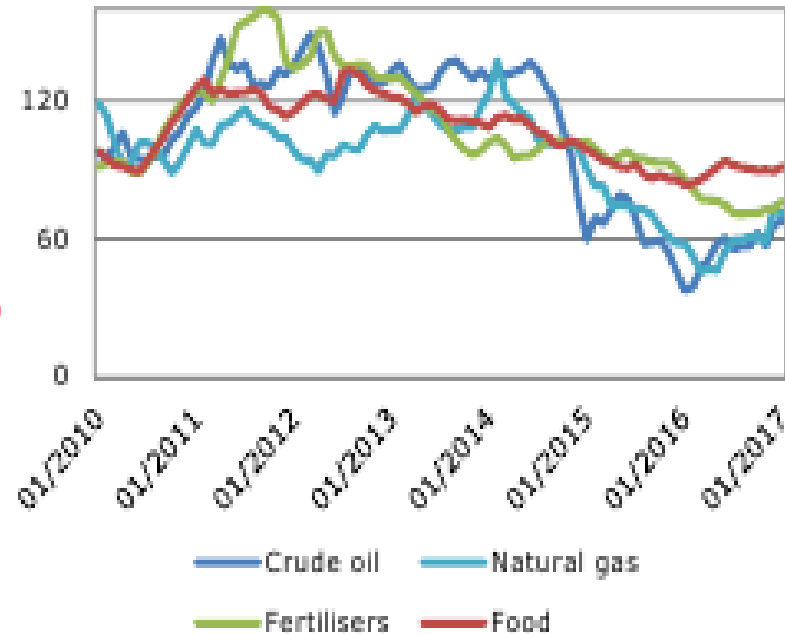
- Main commodity price indices (2010 = 100)***

Energy prices are on upward trend.

Fertilizers prices – slight increase in 2017 after down ward trend since 2012.

Food prices slightly remain calm in 2017.

Cereal prices below five years average



- Environment issues: land and soil erosion, pollution, limited natural resources, climate change**

*Source: World Bank, Global Economic Prospects, World Bank, January 2017 Report; DG Agriculture and Rural development, Short-term Outlook

** Global growth rate less volatile thanks to growth rates of emerging markets and developing countries, WB, January 2017



MAIN MACROECONOMIC TRENDS AND FACTORS

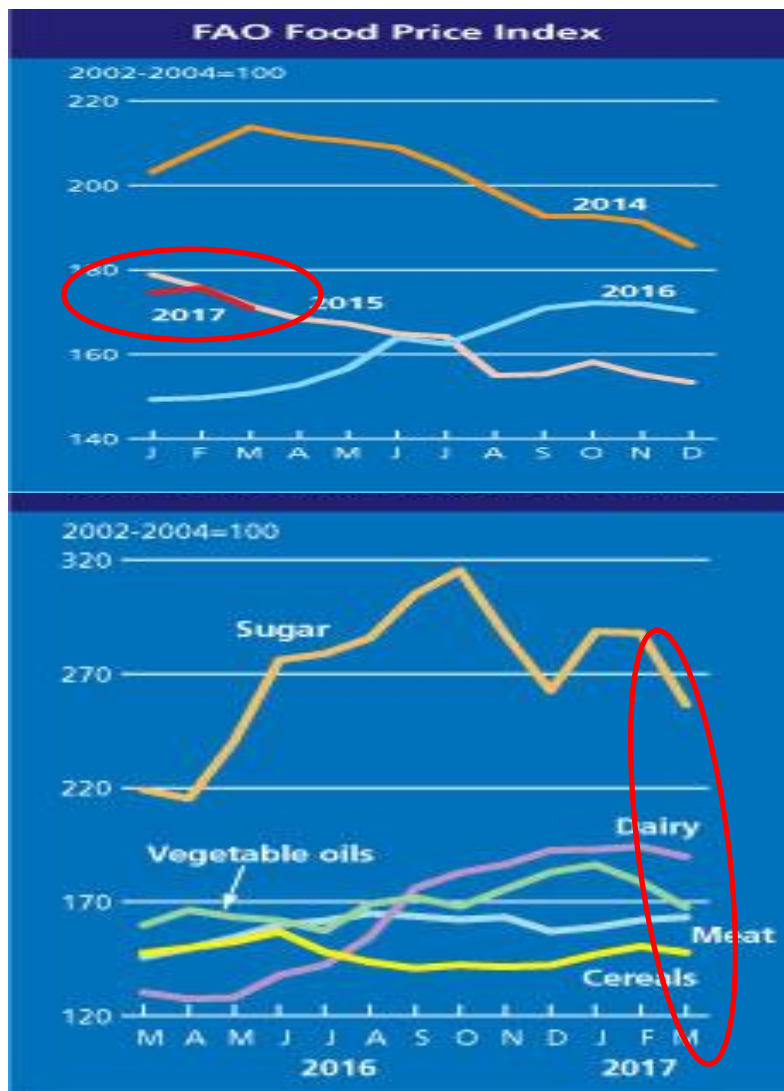
- Population and income increase (7.5 billion in 2017). World population growth is expected to slow to 1.0% p.a. in the next decade.*
- Economic growth in 2017 and 2017-2021: globally – 2.7 and 2.9%; EU - 1.5 and 1.4%; rest of ECA – 1.7 and 1.6%; MENA – 2.5 and 3.3 % **
- Lowering agricultural growth rates; volatility due to climate, environment and market conditions
- Market peculiarities: political uncertainty, exchange rate, commodity prices (oil, fertilizers, cereals and other food products)
- Income growth combined with changing dietary preferences drive firm demand for meat and dairy products.
- Cereals demand is still at the core of the global market; feed demand is the fastest growing sector due to shifting diet preferences.
- Policy issues on agriculture, trade and investments
- Threatening environmental and climate change issues
- Existing information, knowledge, and research

• OECD-FAO AGRICULTURAL OUTLOOK 2014, OECD/FAO 2014, page 24,

** Global Economic Prospects, World Bank, January 2017 Report.



OUTLOOK FOR CEREAL MARKETS: FAO FOOD COMMODITY PRICES*



- **The FAO Food Price Index* (FFPI) - 171 points, down by 2.8% from the previous month, 13.4 % above a year earlier.**
- **The FAO Cereal Price Index - 147.8 points in March, down by 1.8 percent or at the level of a year earlier and 30-35 % below the five years average.**
- **The FAO Meat Price Index - 163.2 points in March, up by 0.7 % from February; by 12 % above a year earlier**
- **The FAO Dairy Price Index - 189.8; down by 2.3 % from the previous month; by 46 % above a year earlier**
- **Overuse of natural resources resulting in land degradation, soil erosion, violation of biodiversity etc.**
- **Climate change and natural hazards driving volatility and quality of agricultural production**

*FAO, World Food Situation, Cereal Supply and Demand Brief, April 6, 2017;
<http://www.fao.org/worldfoodsituation/foodpricesindex/en/>

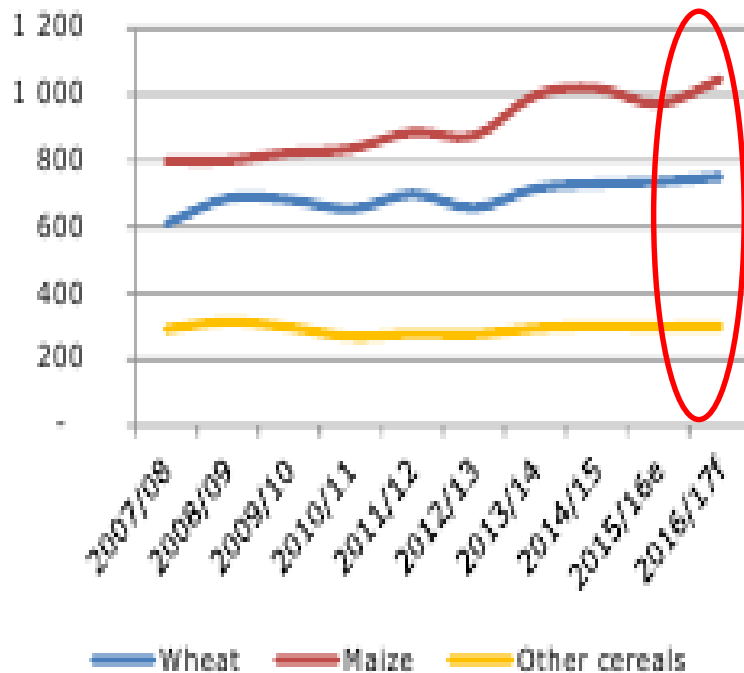


OUTLOOK FOR CEREAL MARKETS IN 2016/ 17 AND 2017/ 18 MY (GLOBAL)



- Cereal production in 2017: 2600 mln t.; wheat production - 740, coarse grains at 1352 , maize-1050 mln t.
- Cereal trade: 386 mln t., down by 2.2 % from previous year. -

World Cereal Production,* 2007/08 - 2016/ 17, mln t



- Cereal utilization: an expansion by 2.2 % in 2016/17 MY and 0.8 percent in 2017/ 18 MY
- SUR***: 2017/18 - 25.4 % , 2016/ 17 - 26.2% ; 20.5 % above of 2007/08 MY level
- Gradual upward trend of cereal food consumption or 1 118 mln t., average p/ c consumption 149kg
- Feed use at 927 mln t. or up by 0.6 % from the 2016/17
- A weaker advance in ethanol production
- Coarse grains use in 2017/18 - a record 1 356 mln t., up by 1.3 % from 2016/17.
- A marginal decline 0.4% of wheat use for feed use due to abundant cheaper coarse grains

OUTLOOK FOR EU CEREALS MARKET IN 2016/ 17 AND 2017/ 18 MY(4)

EU Cereal production in 2016/17*

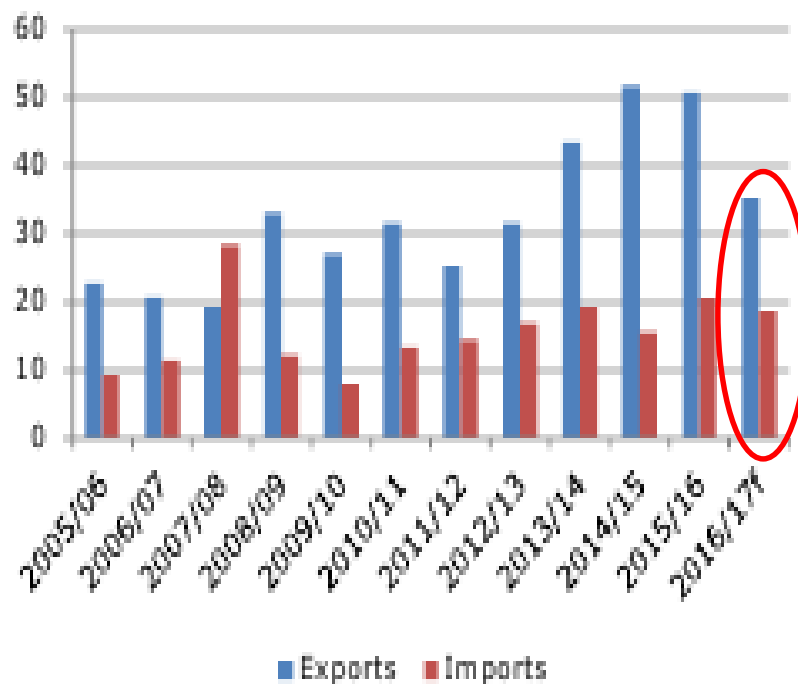
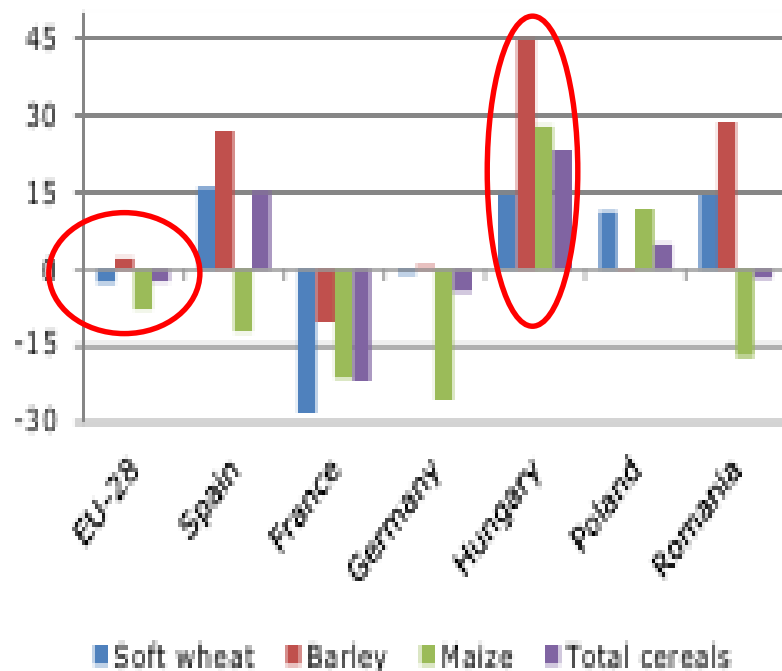
The harvest: affected in **Germany and France**; favorable in **Hungary, Spain, and Romania**.

Total cereal production: 2016/ 17 – 297 mln t.**, by 2.2% below the last five-year average, by 5% below last year's level; usable 2016/ 17 production estimated at 294.5 mln t., 2017/ 18 – 316 mln t.

EU cereal trade (mln. t)*

The EU's cereal export – a decline in 2016/ 17 and a slight increased in 2017/18 MY.

2016/2017 cereal exports stands at 35.2 mln t., below 2013-2016 including: wheat -24 mln t. barley – 7,1 against 14.2 mln t. in 2015/ 16 MY. An increased of intra-EU exports on wheat feed.



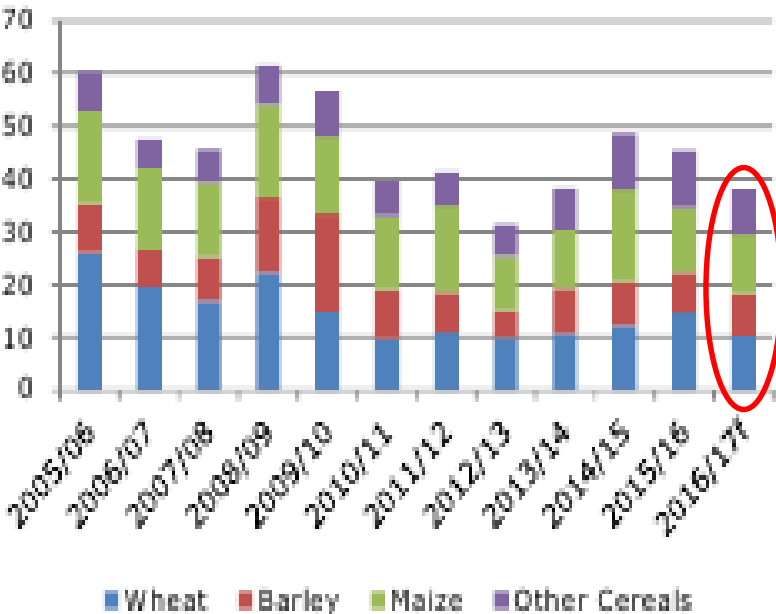
*DG Agriculture and Rural Development, Short –term Outlook, 2017, Report No 17, page 14

** The total cereal production for Europe is around 500 mln t. including Belarus, Russia, Ukraine etc., FAO Crop Prospects and Food Situation, No 1, March 2017

OUTLOOK FOR EU CEREAL MARKET

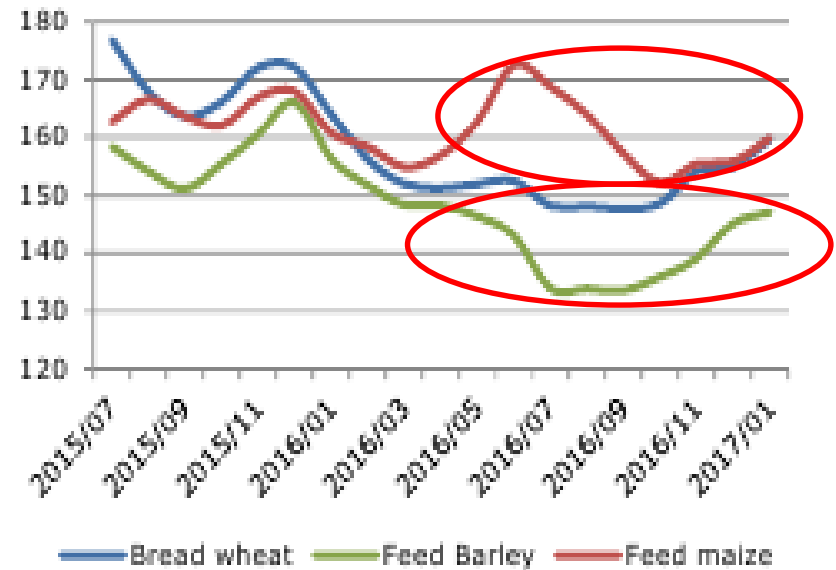
Lower 2016/2017 EU harvest limits exports and tightens stocks.

The stocks are below 40 mln t., SUR is 13.5 %, close to average of 2010 - 2013
Wheat and maize stocks – lower limits.
EU total cereals stocks, 2016/17 MY, mln t. .*



In EU last two year prices –low and stable
Expected lower stocks and increasing international prices slightly push them up since the end of 2016

EU cereals domestic prices (EUR/t)*



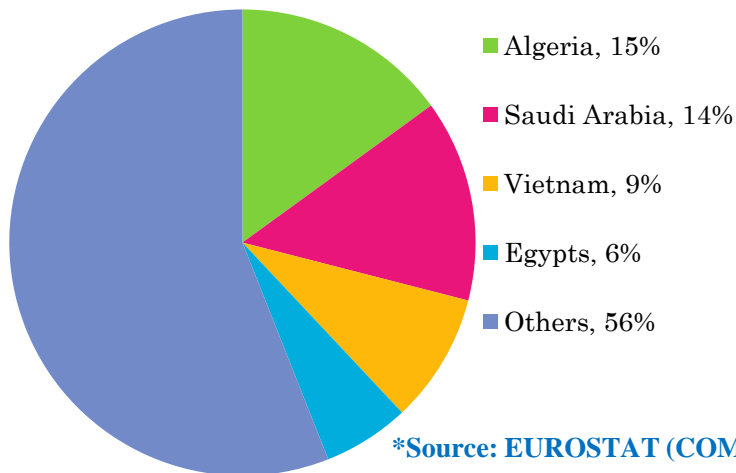
*DG Agriculture and Rural Development, Short –term Outlook, 2017, Report No 17, page 15

EU CEREALS EXPORT AND IMPORT DESTINATIONS *

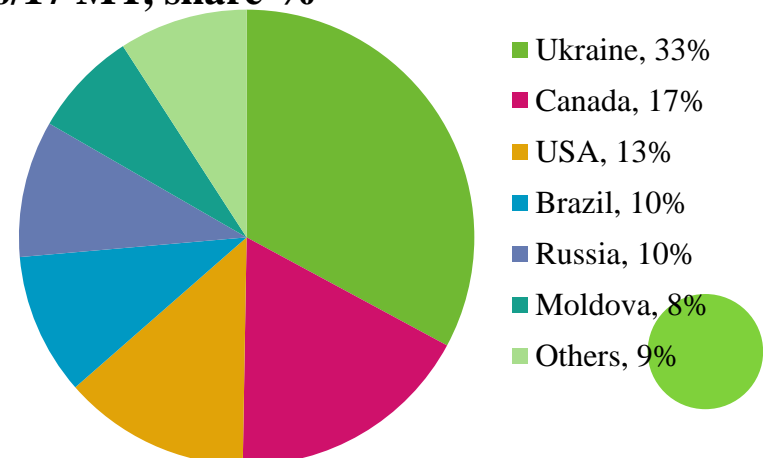


| Country | 2016/17 | | | Country | 2016/17 | | |
|--------------|-------------------|-------------------------|-----------------|---------|--------------|---------------------|-----------------|
| | 2016/ 17 m. t. | Average 2011-15 m.t. | Difference % | | MY mln t. | 2011-2015 mln t. | Difference % |
| Algeria | 3313 | 3057 | -8 | Ukraine | 2551 | 3161 | -19 |
| Saudi Arabia | 2676 | 2797 | 5 | Canada | 1350 | 1136 | 19 |
| Vietnam | 162 | 1693 | 945 | USA | 1031 | 761 | 36 |
| Egypt | 1412 | 1266 | 10 | Brazil | 781 | 637 | 23 |
| Others | 13159 | 11051 | 16 | Russia | 753 | 694 | 8 |
| Total | 20722 | 19864 | -4% | Moldova | 585 | 97 | 504 |
| | | | | Others | 709 | 989 | -28 |

**Export destinations,
2016/ 17; share, %**



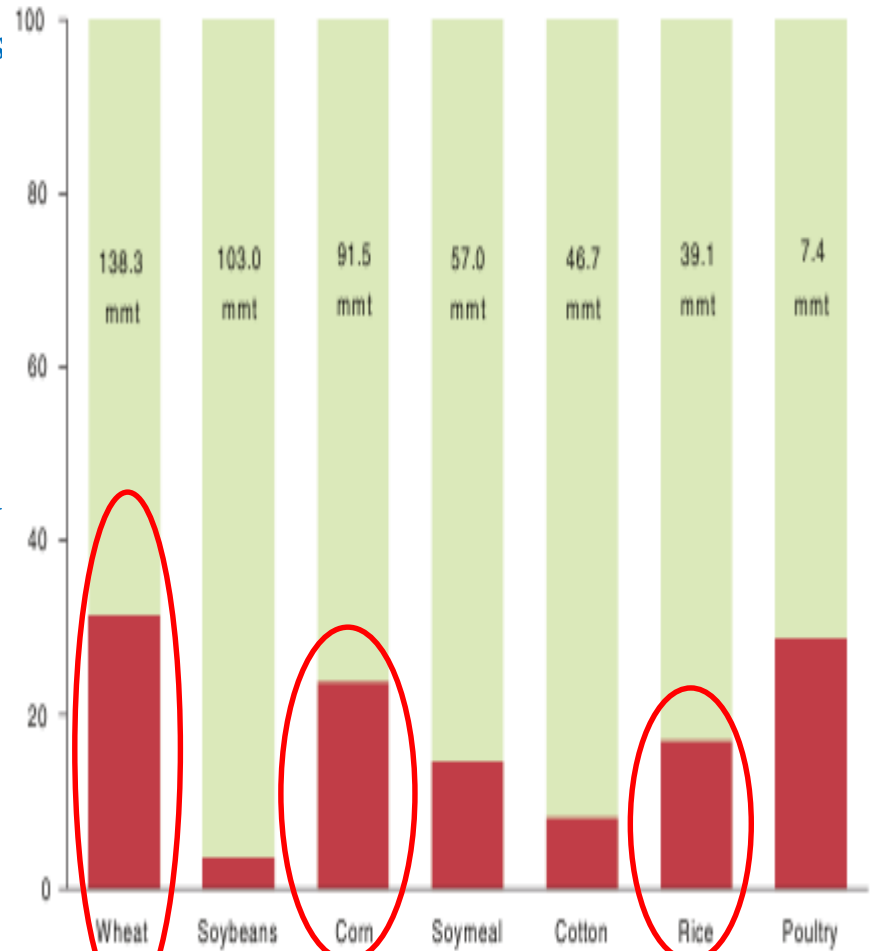
**Import Origins,
2016/17 MY, share %**



*Source: EUROSTAT (COMEXT), EU Cereals Trade Report, 2017

OUTLOOK FOR MIDDLE EAST AND NORTH AMERICA (MENA)*

- Growth of population and increased income drives higher demand for grains
- Domestic cereal production is insufficient due to climatic, geographic constraints, and political uncertainty
- Cereal yields are at about 1.9 t/ ha on average, it is 3.7 t/ha in the world and over 5 t/ha in Europe**
- A large need for cereal imports: 1/3 and ¼ of the world wheat and maize
- EU is the leading cereal trading partner for MENA countries, mainly to North African countries (Algeria, Egypt etc.)
- Egypt - the world's largest wheat importer that is at 12 mln t. in 2016/17
- Algeria is number one exporter from EU



MENA' share of world imports*

*Middle East and North Africa Region: An Important Driver of World Agricultural Trade, USDA, ERS, 2015, page 3

** FAO, 2014???

CEREALS UTILIZATION FOR ANIMAL FEED IN EUROPE

- Over 60% of the total use of cereals is used for to feed (174.8 mln t.) that is supported by the favorable prices and availability of barley and maize compared to wheat in 2016/ 17.*
- A sharp increase in barley feed use (40.6 mln t.) in 2016/17 MY supported by reduced export demand.*
- Feed use of wheat is expected lower by 3.4% compared to the previous MY. Maize feed use is also decreasing slightly because of lack of availability, although prices are low.*
- Increase of cereals for animal feed more than 3.44 percent during 2015- 2018 in EU (estimation)**
- Increase for protein content in cereal animal feed by 3.3% in EU**

Cereals for Animal Feed, EU, 2015/ 16 - 2017/ 18, mln t.

| MY | Wheat | Barley | Maize | Oats | Others | All cereals |
|-----------------|--------------|---------------|--------------|-------------|---------------|--------------------|
| 2015/ 16 | 55.8 | 36.3 | 58.5 | 5.0 | 18.80 | 174.4 |
| 2016/ 17 | 53.9 | 40.6 | 55.0 | 7.0 | 18.4 | 174.9 |
| 2017/ 18 | 53.0 | 40.9 | 56.0 | 7.0 | 18.15 | 175.0 |

*DG Agriculture and Rural Development, Short –term Outlook, 2017, Report No 17

** Author's calculation





UTILIZATION OF CEREALS

- 34 % of the world's grain crop is used to feed livestock (singly or as a compound feed manufactured,, mixed of single feed materials, byproducts etc)*
- In Europe cereal animal use provides a significant portion of calories and protein needed.**
- On average dietary protein comes from: cereals– 50, legumes– 20, animal products 30%
- Protein content in cereals ranges from 7 to 15 % depending on the species

| Crop | Protein Content (%) | Lysine in protein (%) |
|----------------|--------------------------------|----------------------------------|
| Maize | 8.0-11.0 | 1.80-2.00 |
| Wheat | 11.0-14.0 | 2.50-3.20 |
| Rice | 7.0-9.0 | 3.50-4.00 |
| Barley | 8.0-11.0 | 2.90-3.20 |
| Oats | 12.0-14.0 | 3.80-4.00 |
| Sorghum | 9.0-11.0 | 2.00-2.80 |

*FAO, The role of high lysine cereals in animal and human nutrition in Asia - S. K. Vasal,

** Short Term Outlook for EU agricultural markets in 2016/17 and 2017 /18, Directorate-General for Agriculture and Rural Development

– Shortterm Outlook – N°17



FEED PRODUCTION AND CONSUMPTION

- Growing consumption of livestock products and demand for cereal feed with a proper protein content
- FAO's Three Ps: livestock production, adequate protein content in feed, policy for helping the feed chain and plant breeding in collaboration
- The EU's protein content in feed is deficit: between 65 -75%**
- The CAP* for 2014–2020 and EU biofuel policy includes instruments for increasing protein supply due its deficit
- In EU the level of protein from cereals produced and consumed balanced in overall, deficit by other types of feed
- On average protein content in EU is slightly above the world average
- The results of EVONIC demonstrates that protein level differs by countries and by products (the next slide)

*CAP – Common Agriculture Policy, DG Agriculture and Rural Development, Unit for Agricultural Policy Analysis and Perspectives, Brief No 5, December 2013, European Union

**N. Martin: What is the way forward for protein supply? The European perspective 2014, OCL 2014, 21(4) D403 ; OCL 2015, 22(5) D502, Evolution of EU protein deficit (source: UNIP)



CRUDE PROTEIN CONTENT IN CEREALS

Protein Content in Cereals by Products, Europe, 2012-2015*

| <i>Years</i> | <i>Barley</i> | <i>Maize</i> | <i>Oats</i> | <i>Rye</i> |
|--------------|---------------|--------------|-------------|------------|
| 2012 | 10.72% | n/a | na | 8.76% |
| 2013 | 10.40% | 7.65% | na | 8.41% |
| 2014 | 10.45% | 7.52% | na | 8.66% |
| 2015 | 10.42% | 7.7% | 9.56% | 8.08% |
| Worldwide | 10.40% | 7.64% | 10,49 | 8.55% |

*Europe Raw Material Crop Report, 2015; Evonic Industries

Protein Content in Cereals by Countries in Europe, 2015**

| <i>Products</i> | <i>Hungary</i> | <i>France</i> | <i>Germany</i> | <i>Spain</i> | <i>Russia</i> | <i>Ukraine</i> |
|-----------------|----------------|---------------|----------------|--------------|---------------|----------------|
| Barley | 10.11% | 11.15% | 9.8% | 11.15% | 11.47% | 10.37% |
| Maize/ Corn | 7.74% | 7.15% | 8.46% | na | 8.16% | 7.8% |
| Rye | na | na | 8.73% | na | na | na |
| Wheat | 11.58% | 10.56% | 8.73% | 11.79% | 11.81% | 11.04% |

Are their ways to use the available proteins more efficiently?

**Adopted from Europe Raw Material Crop Report, 2015; Evonic Industries

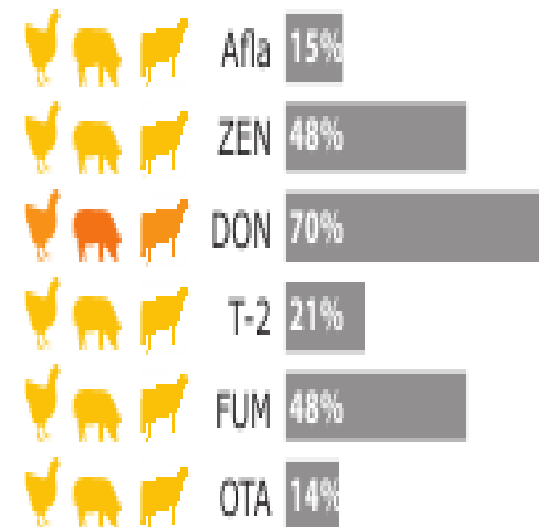
MYCOTOXIN CONTAMINATION OF FEED STUFFS

- Mycotoxins - poisonous chemical compounds produced by fungi, found in food and animal feedstuffs (grains and seeds).
- Microscopic fungi in grain subdivided into field fungi and storage fungi.
- Mycotoxins are very sensitive to climate and environmental conditions due to ecological imbalance, systematic violation of biosphere, climate change (irregular rains, floods, droughts or unusual cold weather).
- Increase of mycotoxin contamination levels observed for corn, finished feed and soy.*
- Deoxynivalenol (DON), detected in 80% of samples, is the most prevalent mycotoxin worldwide, followed by fumonisins (FUM), found in 71% of samples.*
- 76% of feed and raw commodity samples contained two or more mycotoxins.*



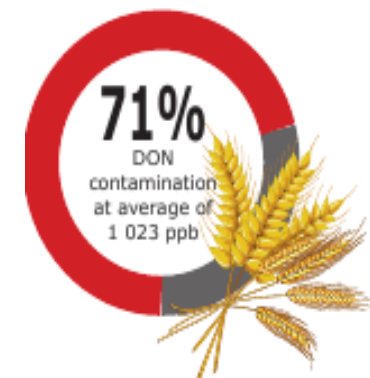
MYCOTOXIN CONTAMINATION WORLDWIDE AND IN EUROPE

- The BIOMON Mycotoxin Survey* on mycotoxin risk changes from 2015 to 2016 with the main crop harvests, 16 511 samples, 81 different countries
- High contamination in European crops in 2014, early 2015, and an increase in 2016: from 45% to 64% above the risk threshold.
- Increases in South-East Asia (from 70% to 76%), East Asia (84% to 88%), Oceania (8% to 24%), South America (from 37% to 74%) and South Africa (from 45% to 73%).
- The main mycotoxins in feed: aflatoxins (AFs), DON, fumonisins, ochratoxin A (OTA), T-2 toxin and ZEA. Concentration of mycotoxins in Europe: AFs and fumonisins – Southern Europe, Don – Northern and Central Europe, ZEA – Central Europe.



species risk assessment according to legend on page 2 and % positive samples

| Geographical Region | AFB1 | ZEA | DON | FB1 | OTA |
|-----------------------|------|--------|--------|-----------|------|
| North America | 8 | 271 | 1,947 | 902 | 1 |
| Central South America | 2-3 | 0-111 | 51-237 | 1030-3121 | 0-9 |
| Europe | 0-3 | 3-37 | 88-968 | 925-3052 | 0-9 |
| Asia | 8-90 | 32-219 | 61-691 | 380-797 | 1-15 |
| Oceania | 1 | 50 | 94 | 109 | 1 |
| Africa | 42 | 25 | 745 | 855 | 6 |



*BIOMON Mycotoxin Survey 2016, Annual Report No 13

COSTS OF PROTEIN AND MYCOTOXIN CONTAMINATION IN CEREALS

○ Socio – economic costs:

- 25%* of the world's crops are affected by mycotoxins annually; in Europe – estimations from 65 to 75 mln t.; additional health costs
 - Annual losses of around 1 billion metric tons of foods and food products or from \$1-5 billion *
- Mycotoxins -stable through the food supply chain
 - A health risk (animals and humans): chronic or cumulative diseases, cancers and immune deficiency, reproductive problems
 - Regulations established in 100 countries; in some it is based on Acceptable daily intake (ADI) or Tolerable daily intake (TDI).
 - International legislation on foods and feeds established by Codex Alimentarius (CAC).
 - Additional cost for monitoring and controlling

Environmental issues:

- Adequate protein nutrition is important for minimization of nitrogen excretion and reduction of pollution.
- Not fully used animal by-products containing protein might pollute
- Mixture use of grain and forage in farming helpful to counteract soil erosion and loss of soil fertility.
- Concentrations of mycotoxins occur as a result of annual weather fluctuations and climatic conditions (aflatoxin accumulation)
- Cold regions with a cool and excessive wet produce DON, ZEA, OTA (fusarium toxins)

Actions for improving situation on mycotoxin contamination needed!

*Achieve safety and compliance by reliably identifying mycotoxins in wheat, corn and other grains. MYCOTOXIN AND FOOD SAFETY IN DEVELOPING COUNTRIES, Intercopen.com, page 9; Interncom April 2013, <http://library.umac.mo/ebooks/b28045592.pdf>



CONCLUSIONS

- Improved macroeconomic conditions, political uncertainty (elections, migration) and environmental threats of sustainability
- Increased demand in cereals for animal feed along with slowing growth rates of agricultural production
- Increased threats of fungal invasion by climate change and sharp weather fluctuations quality and safety of crops
- Raised risks of mycotoxin contamination due to:
 - Climate change and environmental threats (land degradation, soil erosion, pollution, deforestation etc.).
 - A greater availability of food byproducts as animal feed sources or compound feed
- Entered mycotoxins in the feed chain result in economic and social costs
- Limited information and data for assessment of risks related to mycotoxin contamination
- Observed protein in EU reflected in policy documents but still a problem.
- Balanced protein content in cereals by using different cereals and other crops



RECOMMENDATIONS: 10 MAIN ACTIONS

- **Monitoring environmental conditions for cereals production and its use at all levels**
- **Strengthening control on mycotoxin contamination through the food chain**
- **Investing in R & D, education and knowledge on different factors impacting cereal production and utilization.**
- **Developing cereal basket for animal feed for balancing protein content**
- **Reviewing the risk thresholds in regulation documents**
- **Arranging awareness and knowledge sharing on impact of mycotoxins**
- **Increasing efficiency of available proteins use to reduce the needs.**
- **Improving stimulation of local protein production through EU policies.**
- **Increasing the availability of non-vegetable sources of proteins**

Thank you for your attention!

