Oats- a breeders perspective

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Formed 2008 - Combines Institute of Grassland and Environmental Research, Institute of Biological Sciences (IBS), Institute of Rural Sciences (IRS)
Institute of Biological, Environmental and Rural Sciences (IBERS)

- Largest agricultural department in UK
  - > 350 staff
  - >1200 students
  - £27M income (£17M for Research)
- Outcome based structure focusing on delivering holistic solutions to the global grand challenges:
  - Living with climate change
  - Renewable energy
  - Global food and water security
  - Animal and plant diseases
The farms cover land that rises from sea level to 300 metres in the south, to Plas Gogerddan to the north of Aberystwyth.

Dairying is the main enterprise and most of the farms are growing a range of forages and cereals to support animal production.

Plant Good Plant Breeding programmes

- Oats (winter and spring)
- Forage and amenity grasses
- White and red clover
- Field beans, peas
- Energy crops (Miscanthus, willows, reed canary grass)

Other

- Lotus, Lupins
- Forage Brassicas
Plant breeding in Aberystwyth

- Sir George Stapledon established the Welsh Plant Breeding Station at Aberystwyth in 1919.
- S strains of grasses and legumes
- S strains of oats
Oat breeding at Aberystwyth University

- 65% of the oats grown in UK are IBERS varieties
- 120,000 ha grown in UK
  - (70% winter and 30% spring)
- 750,000t produced per year and increasing
- Husked oats for human consumption are increasing
- Programme: winter, spring, husked and naked
- Naked oats for poultry
Oats

- Quality grain
  - Human food
  - Livestock feed
  - Industrial applications
- Low input crop (nutrient, chemicals)
- Value in cereal rotations
  - Diversity, reduction of disease
UK Demand is increasing

* total season forecasts except GB feed compounders, data to end April-14 (102Kt)

Source: Defra
Expansion in oat based products - innovation
Information on oats - HGCA website
A nutritious grain with a unique composition

- Beta glucan
  - Soluble fibre (health benefit) in endosperm cell wall
- Avenanthramides
  - Antioxidants
- High lipid content (up to 16%)
Industry interest

- Healthy food / Unique health boosting properties of oats
- Growth in oat products / Greater diversity of oat products
- Safety issues (mycotoxins)
- Commercial sustainability
  - Yield, milling quality, competitiveness
- UK leads oat innovation
- Increased consumer awareness
- Increased consumer consumption
Collaborations between academia and industry
Oats for human consumption

- A good source of soluble fibre,
  - helps to keep a healthy gut,
  - can help to treat high cholesterol
  - can help to keep blood sugars stable
  - satiety.

- Can add variety to the gluten-free diet
Gluten free

- Oats contain avenin, a protein similar to gluten.
- Research has shown that most people with coeliac disease can safely eat avenin.
- If oats are produced in the same place as wheat, barley and rye, the oats can become contaminated with these other grains.
  - dedicated supply chains
- There are a very small number of people with coeliac disease who may still be sensitive to gluten-free, uncontaminated oat products.
Improving Beta glucan content

- Eating oat beta-glucan regularly helps maintain normal blood cholesterol.

- In view of the increasing prevalence of cardiovascular disease (CVD), identifying functional foods that reduce CVD risk factors (including high blood cholesterol) is an important area of research. A body of evidence has accumulated, strengthening the association between oat beta-glucan consumption and a decrease in blood cholesterol, according to a review by researchers from the University of Manitoba, Canada.

- Beta-glucan, a type of dietary fibre found in abundance in oats, has been recognised as having blood cholesterol-lowering properties. A major proposed mechanism is that dietary oat beta-glucan forms a viscous layer in the small intestine. The viscous layer attenuates the intestinal uptake of dietary cholesterol as well as the re-absorption of bile acids (which the body makes from cholesterol). In response, the body draws upon the pool of circulating cholesterol to produce new bile acids. Lower uptake of cholesterol from the gut combined with more bodily cholesterol used for bile acid production results in reduced levels of cholesterol circulating in the blood.

- Overall, the majority of observational studies published since 1997 support a relationship between dietary beta–glucan and a reduction in blood cholesterol levels. Daily doses of at least 3 grams may reduce plasma total and LDL cholesterol levels by 5-10%, respectively. Such intakes can be achieved by consuming 2-4 portions daily of oat-based products (e.g. breakfast cereals, breads and crackers).

- Interestingly, the mode of administration and/or the food matrix as well as the method of processing the oat products may all influence its cholesterol-lowering abilities. When beta-glucan is added to a liquid matrix, such as milk or fruit juice, it appears to be more effective compared to a solid matrix, such as bread or cookies which yielded conflicting results. Furthermore, the molecular weight and viscosity of oat beta-glucan may play a significant role in determining its cholesterol lowering ability. It has been observed that the physical structure of beta-glucan is prone to being damaged during the processing and cooking of oats, which may decrease its molecular weight and viscosity. However, this remains an area requiring further research.

- The Dietetic Products, Nutrition and Allergies panel of the European Food Safety Authority (EFSA) concluded that on the basis of the data available, a cause and effect relationship has been established between the consumption of beta-glucans and the reduction of blood cholesterol concentrations. Hence, the following health claim has been approved by EFSA: “Regular consumption of beta-glucans contributes to maintenance of normal blood cholesterol concentrations.” To be eligible for this claim, foods should provide at least 3 grams per day of beta-glucans.

- In line with the EFSA opinion, the authors concluded that consuming at least 3 grams per day of oat beta–glucan, as part of a diet low in saturated fat and a healthy lifestyle may promote cardiovascular health.
Health claims

• USDA FDA health claim
  – 4% beta glucan needed in portion serving to reduce cholesterol

• EU EFSA authorised health claim
  – 1g beta glucan needed in portion serving to reduce cholesterol
  – Reduce blood glucose rise after a meal
EU Register on nutrition and health claims

The search tool only allows searches for health claims*, and not nutrition claims.

* Health claims for which protection of proprietary data is granted (and for which the right of use of the claim is restricted to the benefit of the applicant) are only listed here.

You can also download the complete dataset of nutrition and health claims in the following formats: 

Search the register

Claim status: 
- Authorised
- Art.13(1)

Type of claim: 

EFSA Opinion reference: 

Legislation: 
- Commission Regulation

Search: 
- Match entire phrase: glucan

The table will automatically refresh based upon the selections you make.

Showing 1 to 2 of 2 results (filtered from 2,282 total results)
Show 10 results
Oat beta glucan lowers blood cholesterol levels

Plant breeding aims to overcome the lower yield of high beta glucan material
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High Beta glucan lines
Plant breeding Challenges

- Farmers/growers want high yield
- Millers want good milling quality
- Composition important for the food industry
- Health claims require a level in product

Balancing these characteristics is the breeders challenge
Aberystwyth Innovation and Enterprise Campus

- £35 million investment in this site (BBSRC, University)
- Work to start in 2015.
  - new infrastructure and facilities to attract companies and researchers interested in creating commercially viable new products,
  - based on modern approaches to plant breeding.
AU Innovation and Enterprise Campus (AIEC)

- The proposals include:
- Centre for Food, Nutrition and Energy Security
- Future Foods Centre
- Seed Biobank and Processing Facility
- Biorefining Centre
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