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Editorial news and events

Conference Raport*

Symposium on „Dietary Fibre – Chemistry and Physiological Effects" held in Radzików, Poland, 24-25 April 1997, was organised by the Department of Biological Evaluation of Plant Products, Plant Breeding Institute, Radzików and The Kielanowski Institute of Animal Physiology and Nutrition, Jabłonna

The programme of the Symposium focused on three main aspects:

1. Basic data on the chemical composition, structure and functional properties of dietary fibre (DF) in cereals, legume seeds and rape seed, as the main components of foods and feeds, and the analytical procedures used in these determinations.
2. The physiological effects of DF in human nutrition, in health and disease, and in the feeding of pigs, poultry and ruminants.
3. The possibility and need to breed plants selecting for forms with particularly low contents of the DF fractions that have negative nutritional effects.

On the basis of 11 lectures, covering a large field of research and personal experience of the speakers,15 posters and the discussion, the following statements and conclusions were formulated.

Great progress has been made in the analysis and unification of plant fibre determination. The van Soest ADF and NDF methods, which give more precise measurement of cellulose, lignin and part of hemicelluloses and pectins, have replaced to some extent the crude fibre method that is still used in feed analyses and feed allowances. Two methods, the enzymatic-gravimetric and the enzymatic-chemical methods elaborated in the 1980s, are used to estimate total components of dietary fibre. After several years of co-operative studies, the enzymatic-gravimetric method was chosen as the recommended method by the AOAC (1993) in food and feed analyses.

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DF consists mainly of plant cell wall constituents that vary in composition, constitution, structure and properties in different species of plants and stage of plant development. Opinions differ on whether to include resistant starch and non-digestible glycoproteins in DF, as they are strongly bound to fibre components. Varying amounts of crude protein are bound to the fibre (10-20% in cereals to 40% in rapeseed meals). Since there is agreement between the *in vitro* determination of protein not digested by the enzymes used in the DF procedure and the ileal digestibility in cannulated pigs fed rye, wheat, barley and triticale grain and rapeseed meals, it is suggested to include the information on the amount of *in vitro* non-digestible protein bound to DF as an indicator of its *in vivo* digestibility.

Cereal grains differ in their soluble fraction content, its viscosity and water binding capacity. The viscous compounds – mainly the soluble fraction of arabinoxylans (rye) and soluble β-glucans (barley and oats)-lower feed intake and the absorption of nutrients, particularly in young animals in which the intestinal tract is not fully developed, and enzyme secretion and development of intestinal microflora are poor. The high correlation between soluble dietary fibre (SDF) content, rye viscosity, and feed efficiency ratio in broiler chickens makes them a good experimental model in testing cereals with a lower SDF fraction for selection purposes.

In contrast, a higher soluble arabinoxylan content in rye is favourable for baking quality. A 2:1 ratio of soluble to insoluble arabinoxylans was found to be best.

DF in rape seed has a special structure and composition. It is composed mainly of insoluble fractions, which have a much stronger protein and lipid binding capacity than the DF of legumes and cereals. The lower digestibility (10-15%) of protein of rapeseed meal when compared to legume seeds having a similar level of insoluble DF, deserves attention. Almost 40% of rapeseed meal protein is resistant to digestion both *in vitro* and in ileal cannulated pigs.

The binding of proteins into glycoproteins of rapeseed meal is presumably related to high temperature treatments resulting in lower nutrient availability. Intracellular glycoproteins are then real DF constituents, which explains their resistance to digestion by mammalian hydrolases.

The physiological importance of DF is opposite in human nutrition and farm animal feeding. The ability of DF to lower the availability of protein and energy is a positive feature in the nutrition of rich human populations, but is a negative factor in feeding animals, especially pigs and poultry.

The results of research on the chemical composition and nutritional effects of DF suggest that the following breeding objectives should be recommended:

- In rye: new varieties with higher contents of soluble arabinoxylans with a 2:1 ratio of soluble to insoluble fractions, for better baking quality, and with low content of soluble dietary fraction for feed purposes.

- In barley: varieties with lowered soluble β-glucan fraction for beer production and feed, and naked forms with higher levels of soluble β-glucan fraction, as food for humans.
- In oats: naked forms with a high amount of soluble β-glucans for food production.
- In legume seeds: higher protein content and lower amounts of flatulence-causing components (stachyose, verbascose, raffinose) for both food and feed purposes.
- In low glucosinolate rape seed: yellow-seeded varieties with lower insoluble DF fraction and higher protein content.

It was concluded that there is a need for more intensive studies on DF in food technology – e.g. on the inclusion of DF into snack foods, on changes in the structure and the physiological effects of DF in processed foods and feeds.

Basic studies are needed on the enzyme system involved in the building up the structure of the fibre moiety, particularly in rape seed (*Cruciferae*).