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Antioxidant properties of evening primrose (*Oenothera paradoxa*) seed extracts in erythrocyte membranes and brain homogenates exposed to AAPH- peroxy radical initiator

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source (20.1 %) with methionine (0.3 %), lysine (0.1 %), maize starch (58.4 %), cellulose (11 %), rapeseed oil (5 %) and vitamin-mineral mixture and robenidine (5.1 %). This diet was given by tube feeding to seven chickens 21 d old during a 48 h adaptation period followed by a 48 h period of digestion balance. At 25 d, birds were killed 4.5 h after meal and their gizzard and intestinal contents were taken and freeze-dried. Proteins were extracted with boiling SDS, and MW distribution of nitrogen compounds was studied by size exclusion chromatography (Créviu et al., J. Sci. Food Agric. 75 (1997) 217–226).

Apparent faecal protein digestibility in the 'globulin' diet was high (0.872). In the diet, high MW (> 15 kDa) represented high proportions (61.7 %) of total nitrogenous compounds (figure 1). This is due to the high MW of subunits of pea globulin. Legumin polypeptides are about 40 kDa for acid subunits and about 20 kDa for basic subunits. Vicilin polypeptides are about

30–35 kDa and 12.5–19 kDa. Convicilin polypeptides are about 70 kDa. In the gizzard, low MW proportions were very important suggesting high hydrolysis. At the end of the ileum, the main nitrogenous compounds had low MW. Further studies are needed to understand the origin of low MW compounds.

SESSION 2:

LIPID METABOLISM

Communication no. 10

Antioxidant properties of evening primrose (*Oenothera paradoxa*) seed extracts in erythrocyte membranes and brain homogenates exposed to AAPH – peroxyl radical initiator. B. Balasinska, J. Wilczak, M. Jank (Department of Animal Physiology, Veterinary Faculty, Warsaw Agricultural University, Nowoursynowska 166, 02–787 Warsaw, Poland).

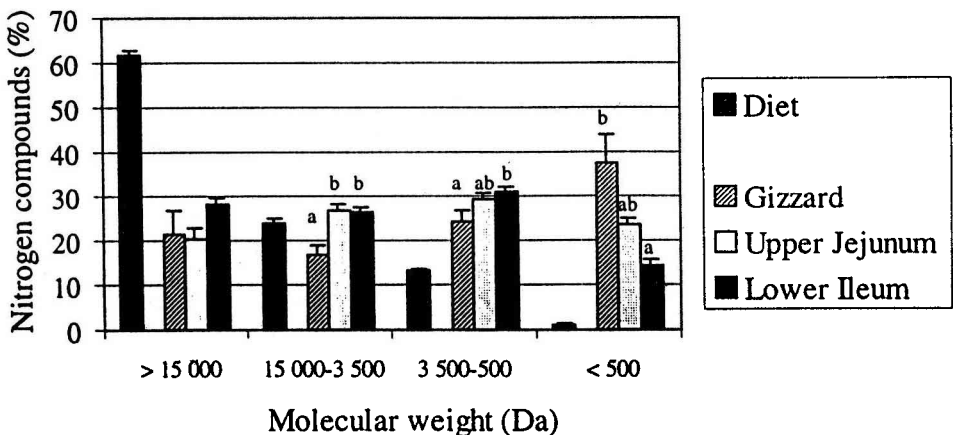


Figure 1. Relative contents of nitrogen compounds (%) in the 'globulin' diet and digesta of birds fed with this diet, according to their molecular weight. Values of the same molecular weight fraction with different letters were significantly different ($P < 0.05$).

In recent years lipid, oxidation has focused the attention of many researchers and practitioners. Lipids are sensitive to oxidation, which in turn reduces the flavour and the nutritive value of fats, oils and lipid-containing products and may increase the rate of cardiovascular diseases. Free radical oxidation in foods and in living organisms may be divided into four distinctive interfacial groups: bulk lipid foods (oils), dispersed lipid foods (membranes and emulsions such as salad dressing), dispersed lipids in living organisms (membranes and organelles), and free-radical reactions in watery fluids in organisms (cytoplasm, plasma). The free radical oxidation of the lipid components in foods by the lipid peroxidation chain reaction is a major problem for food manufactures. An antioxidant may be defined as a substance that, when present at low concentrations compared with those of an oxidizable substrate such as fats, proteins, carbohydrates or DNA, significantly delays or prevents oxidation of the substrate. Suggestions that oxidative stress plays a role in human diseases have led to the proposal that health might be improved by increased dietary intake of antioxidants.

Plant-derived antioxidants are increasingly proposed as important dietary antioxidant factors, and foods rich in antioxidants are receive attention. It is widely accepted that fruits and vegetables have many antioxidant components. Among them flavonoids play a special role. They have applications in food stabilization owing to their ability to protect sensitive foods against peroxidation of oxygen. Recent work has highlighted the effect of evening primrose as a source of antioxidant nutrients. We used a rat brain homogenate and erythrocytes oxidized with 1 mM 2,2'-azobis(2-amidinopropane) dihydrochloride (AAPH) as a model to study the antioxidative properties of the evening primrose extract. Lipid oxidation is determined by thiobarbituric acid reactive substances (TBARS) and conjugated dienes (CD). Samples of brain homogenate and erythrocytes were collected for the analy-

sis of oxidation 1, 2, 4, 24 and 48 h after oxidation induction. Two different concentrations of the plant extract were used: 30 and 150 mg/mL.

Our data clearly indicate that the above-mentioned concentrations significantly inhibited TBARS and CD formation both in brain homogenates and in erythrocytes.

In conclusion, our results show that the extract from evening primrose seeds inhibits the oxidation of polyunsaturated fatty acids. Therefore, it may be of interest for the food industry as a preservative.

Communication no. 11

Protective activity of rutin against lipid peroxidation in the rat. J. Wilczak, B. Balasinska, M. Jank, P. Ostaszewski (Department of Animal Physiology, Veterinary Faculty, Warsaw Agricultural University, Nowoursynowska 166, 02-787 Warsaw, Poland)

The effect of flavonoid-rutin (quercetin-3-rutinoside) (RUT) during dexamethasone (DEX)-induced oxidative stress was investigated in lipid peroxidation and some antioxidant systems in rat brains. DEX administration induced a greater susceptibility to reactive oxygen species (ROS) resulting in an increase in lipid peroxidation, expressed as thiobarbituric acid reactive substance (TBARS) and conjugated diene (CD) production, and an increase in reduced glutathione (GSH) transformation in oxidised glutathione (GSSG). Recently, a lot of attention has been focused on the use of natural antioxidants isolated from vegetables to protect living organisms against damaging effects of ROS. Among them the most effective compounds found in natural antioxidants are flavonoids – a large group of vegetable polyphenols. All experiments were performed using 6-week-old male Sprague-Dawley rats, with an initial body weight of 180 ± 15 g. Animals were fed a regular laboratory diet. DEX ($2 \text{ mg}\cdot\text{kg}^{-1} \text{ b.m./day}$) and