the calf. The aim of this work was to assess the impact of protein source and antigenicity on morphology and some enzyme activities of the jejunum in preruminant calves.

Twenty Holstein male calves were fitted with a silicone T-piece cannula in the duodenum at the age of 3 weeks. After recovery, they were fed a liquid diet based on SMP for 2 weeks, switched to diets containing a mixture (1:1, digestible N basis) of SMP and either HSF ($n = 12$) or SPC ($n = 8$) for 8 weeks, and then return to the SMP diet for 2 weeks. The diets contained similar amounts of digestible N and energy. They were fed at a level of 55 g DM/kg$^{0.75}$/d. A Watson capsule was used to collect mucosa biopsies of the proximal jejunum before (week 0), during (week 2 and week 8) and after (week 10) feeding the soya-based diets. One biopsy was fixed in phosphate buffered formalin for microdissections and morphology measurements. Another biopsy was frozen in liquid nitrogen and kept at –80 °C until enzyme activities were determined.

Feed intake and growth were similar between the HSF and SPC groups over the experimental period. No diarrhoea was observed in the calves fed the HSF diet, in agreement with their moderate plasma antibody response to soya. Effects of antigenicity and antigenicity × time interaction were never significant ($P < 0.05$). On the contrary, villus height decreased (–22 %, $P < 0.01$) between weeks 0 and 2, and increased (+18 %, $P < 0.05$) between weeks 8 and 10. Villi enlarged by 30 % ($P < 0.001$) between weeks 2 and 8, a change that may be interpreted as an age or adaptative effect. Crypt depth also increased (+20 %, $P < 0.001$) between weeks 0 and 2. Specific activities of alkaline phosphatase (–39 %, $P < 0.01$), amino-peptidase N (–15 %, $P < 0.05$) and lactase (–21 %, $P = 0.10$) decreased between weeks 0 and 2. Conversely, the activities of alkaline phosphatase (+82 %, $P < 0.0001$), lactase (+60 %, $P < 0.01$) and dipeptidyl-peptidase IV (+103 %, $P < 0.0001$) increased between weeks 8 and 10. Specific activities of lactase and amino-peptidase N decreased (–31 and –29 %, $P < 0.01$) between weeks 2 and 8 (age or adaptative effect). Treatments had limited effects on amino-peptidase A activity.

In conclusion, feeding soyabean protein, regardless of antigenicity, negatively affected jejunal morphology and the activity of most enzymes studied. These effects, which could be partially reversed by feeding SMP, may contribute to the lower digestibility of soyabean protein usually observed. Further work is needed to clarify the mechanisms of interaction between dietary protein and the gut wall. Finally, antigenicity per se had no significant influence in this experiment. However, soyabean antigens are deleterious to the small intestinal mucosa of sensitive calves (Lallès et al., Vet. Immunol. Immunopathol. 52 (1996) 105–115).

Communication no. 9

Biochemical approach of protein digestion in chickens. I. Crévieu-Gabriel[a], J. Gomez[a], J. Guéguen[b], L. Quillien[b], S. Bérot[b], B. Carré[a] ([a] Station de recherches avicoles, Inra, 37380 Nouzilly, France; [b] Laboratoire de biochimie et technologie des protéines, Inra, rue de la Géraudière, 44072 Nantes, France)

Protein digestion shows variability depending upon protein sources and plant varieties. For example peas, a protein-rich (18–30 %) European leguminous crop, important in animal nutrition, have a rather high variability. However, this variability is not understood. Pea proteins are composed mainly of globulins (60 %) which contain two fractions, proteins 7S (vicilin and convicilin) and 11S (legumin). In order to study the protein structure effect without interfering factors, this protein fraction was extracted with a process limiting structural modifications (Crévieu et al., Nährung 40 (1996) 237–244). It was introduced in a synthetic diet, 'globulin', as the sole protein

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 (Crévieu 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).

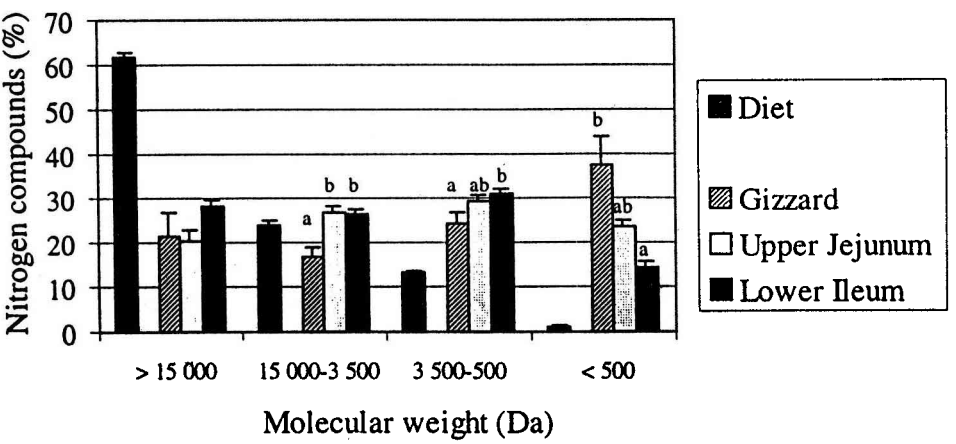

Figure 1. Relative contents of nitrogen compounds (%) in the 'globulin' diet and digesta of birds fed with this diet, according to their molecular weight. Values of the same molecular weight fraction with different letters were significantly different ($P < 0.05$).