incorporation into the liver, plasma and abdominal adipose tissue lipids was studied over a 30 min—48 h period. Lipogenic enzyme activities were also measured in liver extracts from 5 to 11 week old chickens of either line. Furthermore, the abdominal fat of LL or FL animals was enriched *in vivo* with dietary elaidic acid (a structurally labeled fatty acid) in order to determine its half-life in each case, following the cessation of label intake.

The studies with [^{14}C]acetate showed a higher rate of triglyceride secretion from the liver of fat animals than that of the lean ones. Moreover, a significant difference was found between the two lines as concerns the liver Δ-9 desaturase activity, which was 45% higher in FL than in LL. In addition, the labeling technique showed very similar half-lives of 29 and 32 days for elaidic acid removal from the abdominal adipose tissue triglycerides of LL and FL chickens, respectively (Lemarchal *et al.*, 1988; *Comp. Biochem. Physiol.* 89B, 227-231).

In conclusion, our results strongly suggest that the difference in adiposity between the two types of animals is unlikely to be due to a higher lipolytic activity in LL chickens. The major metabolic difference seems to be located in the liver, and to involve the VLDL processing and secretory mechanism which, in turn, could be influenced in some way by the Δ-9 desaturating activity.

Characterization of brown adipose tissue during fetal and perinatal life in cattle and sheep. L. Casteilla [1], D. Ricquier [2], G. Ailhaud [3] and J. Robelin [1] *([1] Laboratoire de la Production de la Viande, INRA, Theix, 69122 Ceyrat, [2] Centre de recherches sur la nutrition du CNRS, 9, rue Jules-Hetzel, 92190 Meudon-Bellevue, and [3] Centre de Biochimie, Parc Valrose, 06000 Nice, France)*

The brown adipose tissue (BAT) is involved in non-shivering thermogenesis and in body weight regulation. The function of this tissue is associated with the presence of a mitochondrial protein, specific to BAT, the uncoupling protein or UCP. We studied the development of BAT during fetal and perinatal life of cattle and sheep. The breeds of cattle and sheep were Friesians and IF x RO x Li crossbreeds, respectively.

We biochemically characterized UCP in most of the newborn adipose tissues (bovine or ovine) except the subcutaneous one. According to these results, BAT would represent about 3 or 4% of newborn body weight. To pursue this topic, we developed a molecular approach and isolated genomic probes for cattle and sheep UCP. We also cloned a cDNA for bovine UCP. These probes were used together with other probes coding for mitochondrial proteins (cytochrome III and IV, ADP/ATP translocator) to study the development of BAT during ontogenesis in cattle and sheep by Northern blotting analysis. We obtained evidence for a gradual development of BAT during fetal life and for the sudden appearance of UCP in the last third of gestation. After birth, UCP mRNA disappeared very quickly, while the apparent number of adipocytes did not vary. BAT seemed therefore to turn into white adipose tissue.

Our results emphasize the importance of BAT for cold adaptation of newborn ruminants and indicate that BAT could be involved in the development of white adipose tissue in particular fat pads.

***In vivo* estimation of fatness to improve bull selection in performance testing station.** G. Renand [1] and J. Robelin [2] avec la collaboration technique de C. Barboiron [3], P. Gillard [1] and B. Perreau [3] *([1] Station de Génétique Quantitative et Appliquée, INRA, Jouy-en-Josas, [2] Laboratoire de la Production de Viande, INRA, Theix, 63122 Ceyrat, and [3] Domaine de Gall, INRA, Avord, France)*

In performance testing stations, the main selection goal is muscle growth, which is indirectly selected *via* a synthetic index combining growth rate and feed efficiency. The need for an estimation of body composition led us to develop a simple and inexpensive method and to predict its effectiveness in increasing genetic improvement of muscle growth.

This simple method is based on the measurement of the size of subcutaneous adipose cells removed by biopsy. Since the experimental animals used were performance tested bulls which were not allowed to be slaughtered at the end of the test, this simple method had to be compared to another more accurate, but much more expensive *in vivo* method, based on the estimation of the dilution space of deuterium.

Sampling of experimental bulls was performed and based on the value of their synthetic selection index two extreme groups were identified. A total of 84 (2 x 42) out of 292 bulls were selected, performance tested in 2 locations and over 3 years. The selection differential between these 2 groups was 3 standard deviation units. Estimation of the correlations needed to take into account the effect of this selection process on the observed variability of the different traits.

The estimated correlation between both lipid weight estimates was +0.66 and +0.54 between lipid percentage estimates. These correlations were quite similar to the mean phenotypic correlations between carcass fat content and fat thickness in samples of cattle slaughtered at a constant age in progeny testing stations.

Using these estimates and the most likely genetic parameters from the literature, revealed that adipose cell size surpassed by 20% the expected genetic progress of an equivalent selection goal to muscle growth (selection on live weight with a constraint on fat weight). This method of *in vivo* estimation of fatness can therefore be used in performance testing stations in France.

Effects of early nutritional deprivation on adipose tissue growth and metabolism in calves. J. Robelin [1] and Y. Chilliard [2] *([1] Laboratoire de la Production de Viande, and [2] Laboratoire de la Lactation, INRA, Theix 63122, Ceyrat, France)*

Two groups of 10 newborn calves received 819 and 1380 g, respectively, of milk replacer daily until 95 d of age. After weaning, both groups were pairfed until slaughter at 533 d of age. Body composition, cellularity and lipogenic activity of kidney and omental fat were determined at 95 and 533 d of age. Milk intake restriction produced a 40% reduction of growth rate and a 68% decrease in lipid deposition between birth and 95 d of age, and a reduction of adipose cell hypertrophy without any effect on adipose cell number. *De novo* fatty acid synthesis, measured by acetate incorporation into isolated cells, glucose-6-phosphate dehydrogenase and NADP-malate dehydrogenase activities were lower in restricted animals. Fatty acid uptake from plasma measured by lipoprotein lipase activity was also reduced by nutritional deprivation. Glucose incorporation into isolated fat cells was very low in both groups compared to acetate incorporation.

All the lipogenic parameters were more than 10 times higher in 533 d old animals which have larger adipocytes, than in younger calves. Early postnatal nutrition had no significant effect on lipid deposition between 95 and 533 d of age. There were no significant differences in body composition, adipose tissue cellularity or metabolism at slaughter. Regardless of the nutrition level, kidney fat appeared to have a higher rate of fatty acid synthesis than omental fat. On the contrary, this latter tissue had a higher lipoprotein lipase activity, indicating a role in fatty acid storage.

Adipose tissue and lipid metabolism in dairy cows during rape-oil duodenal infusion in early and mid-lactation. Y. Chilliard [1], G. Gagliostro [1,4], J. Flechet [1], A. Ollier [1], D. Bauchart [2], M. Vermorel [2], M.-J. Davicco [3] *([1] Lactation Laboratory, INRA, Theix 63122, Ceyrat, France, [2] Energy Metabolism Laboratory, [3] Unit of Mineral Metabolism Regulation in Small Ruminants and [4] INTA, Balcarce, Argentina)*

Rape-oil was continuously infused (1.0—1.1 kg/d) for 3 weeks into 6—8 cows after calving (as compared to 6—7 control cows, trial 1) and into 9 cows after the second month of lactation (cross-over design, trial 2, Chilliard and Gagliostro (1988; *Reprod. Nutr. Dev.* 28 (suppl. 1), 173-174). The aim was to study the effects of exogenous long-chain fatty acids, without