11.3 ± 1.2 arbitrary units (AU) /µg of total RNA (± SE) for weeks 1, 2, 4, and 12, respectively). Similarly, levels of hepatic apo B were unchanged between weeks 1 and 4 (2.5 ± 0.3, 3.1 ± 0.5, 3.5 ± 0.5 AU/10^9 cells (± SE) for weeks 1, 2, and 4, respectively). However, in week 12, apo B levels were 3.7 times higher (9.4 ± 2.4 AU / 10^9 cells, ± SE, $p < 0.01$) than in weeks 1–4.

These results indicate no changes in the level of hepatic apo B gene expression during the first 4 weeks of lactation although lipid infiltration increases by 85% during this period. However, the dramatic accumulation of hepatic apo B recorded in week 12, which occurred without changes in levels of mRNA, may have resulted from either a higher rate of tranlaction and/or a decrease in the rate of intracellular apo B degradation.

Effects of dietary cholesterol and fatty acids on the lipid composition of muscle in the preruminant calf. L Leplaix-Charlat, D Durand, C Legay, C Leoty, R Souchet, D Bauchart *(INRA, Laboratoire Croissance et Métabolismes des Herbivores, 63122 Saint-Genès-Champanelle, France)*

Muscle lipids determine the dietetic and organoleptic qualities of meat in various species. In the preruminant calf, a functional monogastric, lipid composition of muscle tissues can be modulated by nutritional factors, mainly by the lipids of the milk replacer. The combined effects of the ratio of saturated to polyunsaturated (PUFA) fatty acids and the cholesterol in the milk replacer on lipid composition of the rectus abdominis (RA) muscle in the preruminant calf have been determined.

Twenty-two 4-week-old male F x H calves (65 ± 5 kg BW) were fed for 17 d one of the following diets: 1) a conventional milk replacer (5.2 Mcal/kg DM) containing triglycerides (TG, 23% diet DM) from either tallow (T, 4% of PUFA n–6; $n = 6$) or soyabean oil (S, 57% of PUFA n–6; $n = 5$); or 2) the same diets (T and S) supplemented with cholesterol (1% diet DM) (TC, $n = 6$; SC, $n = 5$).

A muscle (RA) sample (6 g) was taken at slaughter and immediately frozen in liquid nitrogen. Total lipids were extracted in chloroform/methanol (2:1, V/V) and TG, total cholesterol (TC) and phospholipids (PL) were determined by enzymatic or colorimetric methods. TG and PL were also isolated by thin-layer chromatography and their fatty-acid (FA) composition was determined by gas-liquid chromatography.

Substitution of tallow for soyabean oil in the milk diet did not modify significantly mean liveweight gain (LWG; 0.9 kg/d). It increased total lipids in RA muscle (11.1 *vs* 8.6 mg/g of fresh tissue), because of the 2.2 times increase of TG ($P < 0.05$). Similar variations were observed with the TC diet compared to the T diet (11.5 *vs* 8.6 mg/g). On the other hand, addition of cholesterol to the S diet led to a decrease of total lipids (8.9 *vs* 11.1 mg/g, $P < 0.05$), mainly because of a decrease in TG (–38%). Compared to the diet T, the PUFA-rich diet increased the C18:2 n–6 proportion in TG (x 16; $P < 0.05$) and PL (x 2; $P < 0.05$) to the detriment of C18:1 n–9. Addition of cholesterol to diets T and S did not modify the LWG or FA composition of total lipids in RA muscle.

Dietary lipids only affect the TG fraction of lipids in RA muscle. Dietary PUFA n–6 favour TG synthesis by muscle tissue, probably because of the stimulation of TG-rich lipoprotein production by the liver, as described elsewhere in the calf. Finally, addition of cholesterol does not lead to a higher cholesterol content in RA muscle.

Étude de la variation de composition en acides gras des tissus adipeux de petits ruminants : analyse par GC/MS. A Rouzeau [1], P Bas [1], L Eveleigh [2], D Sauvant [1] *([1] Laboratoire associé de nutrition et alimentation INRA de l'INA PG; [2] Laboratoire de chimie analytique de l'INA-PG, 16, rue Claude-Bernard, 75231 Paris Cedex 05, France)*

Les tissus adipeux sous-cutanés des petits ruminants ont la particularité de pouvoir s'enrichir en acides gras ramifiés (AGR). La spectrométrie de masse est utilisée pour déterminer la structure des acides gras (AG) et tenter d'en déduire leur origine (micro-organismes du rumen ou synthèse endogène).

Quatre tissus adipeux (2 internes : omental et périrénal, et 2 sous-cutanés : sternal et caudal) sont étudiés chez 2 agneaux et 2 chevreaux abattus vers 25 kg de poids vif (14 et 17 sem d'âge, respectivement). Les animaux sont alimentés depuis l'âge de 7 sem avec une ration complète

à base de foin de luzerne, de pulpes de betteraves et d'orge (66, 17 et 15%/MS respectivement). Les AG sont séparés par CPG puis fragmentés dans un piège à ions (Finnigan, ITD 800). Le chromatogramme est reconstruit à partir du courant ionique total en mode balayage sous impact électronique.

Dans le tissu le plus riche en AG, sur 96 détectés, 62 ont été identifiés avec une bonne certitude. Leurs teneurs varient selon 2 principales lois : d'une part, une substitution marquée entre les AG saturés (AGS) pairs (de 24,9 à 60,0%) et les AG insaturés (AGI de 60,5 à 33,0%) et, d'autre part, une accumulation supérieure à 5% des AGR lorsque les AGS sont inférieurs à 40%. L'amplitude de variation des AGS impairs est faible (de 2,82 à 4,17%) comparée à celle des AGI impairs (de 0,59 à 4,32%). L'accumulation des AGR est bien plus marquée dans les tissus sous-cutanés des chevreaux, lesquels sont vraisemblablement plus en excès d'énergie que les agneaux. La richesse en AGR est due aux AG mono-CH_3 substitués (2, 4, 6, 8, 10), en particulier aux 4-CH_3 et aux AG di- ou tri-CH_3 substitués, quantitativement aussi importants que les mono-CH_3 substitués. Les AGiso s'accumulent dans une proportion moindre (de 1,21 à 2,91%) alors que les antéiso prennent la tendance inverse (de 0,78 à 1,98%). Le profil des AGR varie donc amplement en fonction de leur accumulation. La teneur en AGiso et AGantéiso chute de 80 à 20% des AGR lorsque ceux-ci excèdent 5% des AG totaux. .

Ces résultats suggèrent, sous l'hypothèse d'une origine ruminale des AGiso et antéiso, une origine hépatique dominante des AGR en excès et essentiellement à partir de méthyl malonyl-CoA.

Effects of dietary protein supplementation during feed restriction on corticotrope status in Creole kids. G Aumont [1], N Poulin [2], Y Cognie [2], D Feuillet [1], H Varo [1] *([1] INRA, Station de Zootechnie, BP 1232, 97185 Pointe-à-Pitre Cedex, Guadeloupe; [2] INRA, Physiologie de la Reproduction, 37380 Nouzilly, France)*

It was previously shown that severe feed restriction during the growth period increases cortisol response to ACTH in Creole kids and Black Belly sheep (Aumont *et al*, 1993). The objective of this study was to investigate the effects of dietary protein supplementation during feed restriction on the corticotrope status of Creole kids. Four groups of 6 male Creole kids, 4.5 months of age, were constituted in a 2 x 2 factorial design: restriction to maintenance (1.6 MJ metabolizable energy/d) during a 2 *vs* 4 months period; and feeding with an 8 *vs* 14% g crude protein/kg DM diet (difference as fish meal). A fifth group of 6 animals was fed *ad libitum* to get a 60 g/d body-weight gain.

Determinations of α-amino acids in plasma confirmed that protein supplementation was effective. The number of cortisolemia peaks during nycthemeral period was unaffected by dietary restriction, protein supplementation, and time of restriction. However, feed restriction increased the cortisol peak amplitude during the dark period. Feed restriction increased cortisol response to ACTH injection (0.25 IU/kg BW) at 7 h and 12 h ($P < 0.01$). Protein supplementation partially inhibited this enhancement response to ACTH injected at 12 h ($P < 0.01$). Feed restriction increased cortisol response to AVP injection (1 µg/kg BW) at 7 h and 12 h ($P < 0.01$). Feed restriction increased ACTH response to AVP injection at 7 h and 12 h but this effect was totally inhibited by protein supplementation during AVP injection at 7 h.

These results suggest that feed restriction affects corticotrope axis regulation at both peripheric and central levels in kids. The mechanisms by which dietary protein supplementation inhibits enhancement of cortisol production by feed restriction at these levels remain unknown.

Étude du métabolisme azoté chez la chèvre en lactation à l'aide du ^{15}N. J Brun-Bellut, G Blanchart *(ENSAIA-INRA, laboratoire de sciences animales, 2, avenue de la Forêt-de-Haye, 54500 Vandœuvre, France)*

La répartition de l'azote au cours de son utilisation par une chèvre en lactation est suivie à l'aide de l'apport dans la ration d'une dose unique d'un foin marqué à l'isotope ^{15}N.

Une chèvre en milieu de lactation produisant environ 2 kg de lait par jour reçoit en 2 repas un régime de foin de ray-grass (1 kg) et d'orge (800 g). Le jour 0, le foin conventionnel est remplacé par le même foin marqué au champ ($^{15}N/N$ = 1,586%) par arrosage du sol avec $^{15}NH_4$ $^{15}NO_3$. L'enrichissement en ^{15}N des fèces, de l'urine, du