Control (CL) and quality (QL) chicks were fed ad libitum on isoenergetic diets containing 20% crude protein but differing in their lysine content (from 7.5 to 11.3 g/kg). Fractional rates of protein synthesis (Ks) were measured in vivo in the Pectoralis major muscle (breast muscle) with a flooding dose of [^{5}H]-Phe [Garlick et al (1980), *Biochem J* 192, 719-723]. Fractional rates of proteolysis (Kd) were estimated for the same tissue as the difference between protein synthesis and deposition. Data were analysed by two-way Anova.

QL chicks exhibited slightly higher body and breast muscle weights than the CL ($P > 0.05$). They also appeared less sensitive to the lysine deficiency, both in terms of body and muscle weight. Consequently, their dietary requirement was lower.

In chicks fed on an adequate lysine intake, muscle protein turnover rates were similar in the two lines ($P > 0.05$): Ks, 13.0 ± 0.9 and 12.7 ± 1.0%/day in CL and QL chicks, respectively; Kd, 3.9 ± 1.1 and 3.8 ± 1.2%/day, respectively. Similarly, there were no differences between lines ($P > 0.05$) in capacities for protein synthesis Cs, ie, RNA/protein ratio: Cs, 12.1 ± 0.4 and 12.4 ± 0.2 mg/g in CL and QL chicks, respectively. The line-related changes in protein synthesis and proteolysis may be too small and difficult to detect although they may generate a clear modification in skeletal muscle mass over a long period.

In both lines, a severe lysine deficiency (7.5 g lysine per kg) resulted in significantly increased Ks and Cs (+35–45 and +60–85%, in Cl and Ql chicks, respectively), in agreement with previous results [Tesseraud et al (1992), *Reprod Nutr Dev* 32, 163-175; Tesseraud et al (1996), *Br J Nutr* 75, 853-865]. The higher increase of Ks, Cs and particularly Kd in QL compared with Cl chicks suggests that the responsiveness of breast muscle protein turnover to the lysine deficiency depends on the genotype.

In conclusion, these preliminary results show that the effects of lysine deficiency vary in the two lines. Further investigations of protein turnover in various muscles need to be undertaken to improve understanding of the metabolic control by amino acids and genotype.

Effects of ruminal or postruminal fish oil supply on cow milk yield and composition. Y Chilliard, M Doreau *(Laboratoire sous-nutrition des ruminants, Inra, Theix, 63122 Saint-Genès Champanelle, France).*

Fish oil (FO) addition to dairy cow diet decreases the milk fat content. This could facilitate the management of milk fat quotas by farmers, but could also change the milk quality. The aim of this study was to compare the respective effects of a control diet (C), and either a ruminal (R) or a duodenal (D) infusion of FO (menhaden type, 300mL/day for 4 weeks), on milk yield and composition (fat and protein contents, fatty acid profile). A 3 × 3 latin square was designed on 6 mid-lactation Holstein cows fitted with rumen and duodenum cannulas.

FO infusions did not change milk yield (22.7 kg/day) despite decreases in oil-free dry matter intake (C, 19.8; D, 17.7; R, 15.9 kg/day). Milk protein content was significantly lower with R infusion (C, 29.7; D, 28.6; R, 27.8 g/kg), and milk fat content with both infusions (C, 35.4; D, 32.2; R, 25.1 g/kg).

The decrease in milk fat yield (–46 g/day) with D infusion was mainly due to a decrease in C16:0 (–52 g/day) and *cis*-C18:1 (–13 g/day) secretion, that was compensated in part by an increase in C20:5 (+10 g/day) and C22:6 (+3 g/day) secretion. The sharp decrease in milk fat yield (–216 g/day) with R infusion was due to a lower secretion of C4:0 to C14:0 (–67 g/day), C16:0 (–79 g/day), C18:0 (–45 g/day) and *cis*-C18:1 (–98 g/day), that was compensated

in part by a higher secretion of *trans*-C18:1 (+63 g/day), C20:5 (+1 g/day), C22:6 (+2 g/day) and other C20-C22 fatty acids (+28 g/day).

Unprotected FO addition to dairy cow diet (R infusion) was shown to decrease the milk protein content, to decrease sharply the milk fat content and to increase the secretion of *trans*-C18:1, that arose from changes in rumen ecosystem and was probably the cause of the collapse of mammary lipogenesis. Protected FO addition (D infusion) would decrease the milk fat content and increase the *n*-3 polyunsaturated fatty acid secretion.

Heavy sustained exercise-induced changes in body water compartments. P Ritz [1], N Fellmann [2], G Pickering [2], B Beaufrère [1], J Coudert [2] *([1] Laboratoire de nutrition humaine; [2] Laboratoire de biologie et de physiologie du sport, CRNH-Auvergne, 63000 Clermont-Ferrand, France).*

Calculation of lean body mass (LBM) from total body water (TBW) measurements assumes a known hydration coefficient for LBM. An increase in plasma volume (PV) is established during prolonged and repeated exercise and could be the consequence of either a fluid shift from intracellular and/or interstitial compartments or of TBW retention. In the latter case hydration of LBM would change. The aim of this study was to measure changes in body water compartments during a 7-day endurance raid and their consequences on LBM estimates.

Nine subjects (42.1 ± 7.8 year, mean ± SD) engaged in a triathlon of 595 km and 13.100 m cumulative gain in altitude. PV (Evans Blue dye dilution), TBW (^{18}O dilution) and extracellular water (ECW, Bromide dilution) were measured before (C) and after (R, day + 1) the raid. Daily changes in TBW (BIA, 100 kHz), ECW (BIA 5 kHz) and PV (from changes in haemoglobin and hematocrit) were also assessed. Although the weights of the subjects remained stable, (68.4 ± 6.5 kg day 1, 68.1 ± 6.8 kg day 7), an inflation of all body water compartments was observed; between C and R, increases were +22 ± 11% (PV, $P < 0.001$), +4.1 ± 2.0 L (TBW, $P < 0.001$) and +2.0 ± 1.3 L (ECW, $P < 0.001$). PV, TBW and ECW significantly increased from day 1 to day 4 then plateaued till day 7-8.

In conclusion, heavy sustained exercise induces a body water retention, in all compartments including intracellular water. If hydration of LBM had been kept constant, this would result in an increase of LBM by 5.7 kg and an equivalent loss in fat mass, which is energetically impossible. In circumstances prevailing in this study changes in body composition cannot be estimated from changes in TBW.

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Binding of anti lipoprotein lipase immunoglobulins to chylomicrons in autoimmune type I hyperlipidemia. V Pruneta [1], P Moulin [1], F Labrousse [2], P Bondon [3], G Ponsin [1], F Berthezène [2] *([1] Laboratoire de métabolisme des lipides; [2] Service d'endocrinologie et des maladies de la nutrition; [3] Laboratoire de biochimie, Hôpital de l'Antiquaille, 69005 Lyon, France).*

Secondary hyperchylomicronemia are mostly induced by diabetes mellitus and/or environmental factors such as excess of alcohol or carbohydrate intake. We describe a rare case of secondary hyperchylomicronemia induced by an autoimmune disease in a 35-year-old woman who presented a severe and intermittent type I hypertriglyceridemia (TG: 2–60 mmol/L). Treatment by fresh plasma exchange, strict dietary therapy and administration of fibrates or *n*–3 fatty acids were unable to maintain a consistent remission. Because of an history of familial and