The Ruminant Nutrition Symposium titled “Modulation of Metabolism with Nutrition and Management” was held at the joint annual meeting of the American Society of Animal Science on July 10-14, 2011, in New Orleans, LA. The objective of this symposium was to provide new information regarding the complicated processes of pre- and postnatal nutrition on the metabolism and production efficiency of dairy cattle. This topic, with regards to meat producing animals, was previously covered at the 2010 joint animal meeting held in Denver, CO on July 11-15, 2011, by 2 symposiums organized by the ASAS Western Section Symposium titled “Prenatal Programming of Offspring Quality 1: Basic Concepts and Experimental Evidence” and “Prenatal Programming of Offspring Quality 2: Evidence for Impacts of Maternal Nutrition on Livestock Production.” However, because dairy cattle are managed so differently than beef cattle and the primary product produced is dissimilar, the committee believed that this topic deserved special consideration for dairy cattle.

The primary role of the dairy cow is to help provide high-quality protein and other nutrients through lactation for human consumption. It is clear that these high-producing and long lactations are stressful on the cows and minor changes in nutrition and management can have significant impacts on the profitability of these farms. More recently, it has been realized that nutrient supply and hormonal signaling at specific periods of gestation and postnatal development may exert permanent changes to metabolism affecting lifetime performance, body composition, and metabolic function of the dam or their offspring or both. These processes, occurring during gestation or shortly after parturition or both in the offspring, have been generally referred to as ‘fetal programming’ or ‘metabolic imprinting’ and the potential causes and consequences in beef cattle have been reviewed recently by Funston et al. (2010). However, there has not been a complete review of current research regarding this topic with specific reference to dairy cattle.

The first presentation, provided by Alex Bach (Bach, 2012), focused on fetal and early postnatal nutrition, its role on long-term lipid and glucose metabolism by offspring, and if it has consequences on future milk production. The authors showed that high-energy diets during the last few weeks of gestation may result in elevated glycemia, which potentially may alter fetal adipose tissue development. Because most research efforts focus on the nutrition of dry cows to minimizing metabolic disorders postpartum, little attention has been devoted as to how these managements affect the metabolism and productivity of the offspring. The nutritional needs of the pregnant cow should also consider requirements for placental and fetal development and may affect the health and performance of the offspring. Hence, newborn calves and heifers are fed to meet growth targets without compromising mammary development but experiments that examine the impact of the growth rate on future milk production are rare. Bach (2012) did also show that future milk yield not only depends on mammary development, but also the hormonally-regulated nutrient partitioning. There are some periods of time when nutrition may have long-term impacts on metabolic function and nutrient portioning. Finally, the first months of post-natal life seems to be critical because elevated growth rates or increased micronutrients during this period of development are positively associated with increased future milk production compared with calves grown at slower rates.

Second, nutrition and management during late-gestation on the occurrence of health problems peripartum and future milk production was presented by James Drackley (Drackley, 2011). Obesity and extreme under-nutrition may adversely impact postpartum production. Drackley (2011) showed evidence that greater energy diets peripartum do not increase future milk production and even