

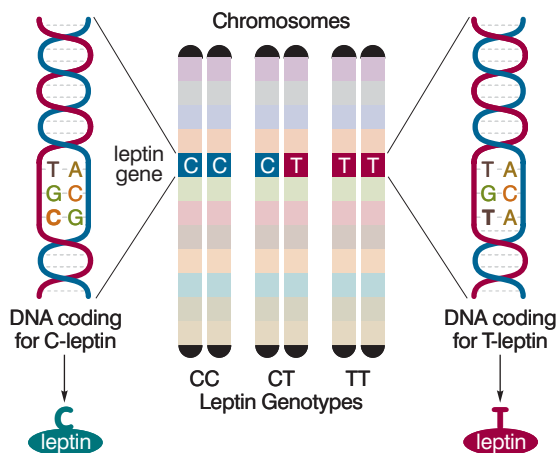
How Leptin Affects Production

Productive cows generally lose body condition after calving because their energy intake fails to keep pace with the energy demand for milk production. Fat cows tend to lose more condition than their thinner herdmates, partly because they eat less. Recent research has shown that the hormone, leptin, is one of the factors responsible for controlling these events.

Leptin is a protein hormone secreted primarily by adipose tissue (body fat) cells. As illustrated in the diagram below, obese animals have higher blood leptin concentrations than animals carrying less fat. The level of leptin circulating in the blood is detected by receptors in the brain. When leptin molecules bind to these receptors, neural and hormonal signals are transmitted to suppress appetite and increase metabolic rate.

Recently, researchers have discovered that the story is not quite that simple. Depending on their genotype (the genetic code inherited from their parents), individual cattle may produce two distinct leptin variants called 'C-leptin' and 'T-leptin'. As illustrated in the diagram above, cattle of the CC-leptin genotype produce only C-leptin. Those of the TT-leptin genotype produce only T-leptin. The TC-leptin genotype produces both variants. It is thought that only the C-leptin variant is recognized by leptin receptors. Because T-leptin is not recognized, high blood levels of this variant do not result in appetite suppression signals being sent.

Researchers at the University of Saskatchewan have demonstrated that leptin genotype affects milk production. Using DNA testing, they determined the genotypes of 416 Holstein cows from 11 herds: 40% of the cows were of the CC-leptin genotype, 43% were CT and 17% were TT. Analysis of DHI production records for these cows indicated that, over a complete lactation, TT cows produced an average of 1.5 kg milk/day more than CC cows;



CT cows produced 0.91 kg/day more than their CC herdmates. During the first 100 days in milk, TT cows produced an additional 2.44 kg milk/day with 72 grams/day more protein. CT cows produced an additional 1.74 kg milk/day with 50 grams/day more protein compared with cows of the CC genotype.

Meril Limited has recently introduced a commercial genotype test (Igenity™ L) which makes it possible to identify TT-leptin cattle, creating an opportunity to mate these individuals to produce TT offspring programmed for greater feed intake.

source: F.C. Buchanan et al., J Dairy Sci 86:3164(October 2003)

