

## Heat treatment of cottonseed to increase its value as a dairy supplement

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The objective of this experimentation was to identify the optimum temperature to heat treat cottonseed for the purpose of improving protein utilization, and to measure potential milk production response to feeding of optimally heated cottonseed. Linted cottonseed was roasted to 134, 141, 150, 155, 159, 176 or 210°C and cooled immediately or held for 30 minutes at the elevated temperature before cooling. Available lysine, measured by the dinitrofluorobenzene method, decreased rapidly at temperatures above 159°C. Maximum post ruminal available lysine, the product of lysine availability and ruminally undegraded protein (determined by the in situ method) was achieved when cottonseed was heated to 141 or 150°C and held without cooling for 30 minutes.

In another study, delinted cottonseed (unheated control, and the following cottonseed treatments with 30 minutes holding time : 136, 146, 156 and 166°C) were utilized in a heifer feeding study and a lactation trial, both using a double 5 x 5 Latin square design. Blood plasma branched-chain amino acids, used as an indicator of protein absorption from the gut, plateaued with the cottonseed heated

to 146°C. Cottonseed heated to this temperature also supported the highest milk yield of cows, with the unheated, 136, 146, 156 and 166°C treatments resulting in 36.9<sup>b</sup>, 36.7<sup>b</sup>, 38.2<sup>a</sup>, 37.0<sup>ab</sup>, and 35.8<sup>b</sup> kg milk/cow/day, respectively. The optimum temperature for treating soybeans to improve protein utilization was also found to be 146°C followed by 30 minutes at this temperature before cooling (Faldet *et al*, 1988, J Nutr, 122, 151).

A lactation study was conducted with optimally heated linted cottonseed (146°C - held for 30 min). Three groups of cows (14 - 17 per group) were placed on experiment at parturition. Control cows received soybean meal as a protein supplement, and treatment cows received a diet with 15 % linted cottonseed (heated or unheated). Milk production through five weeks of lactation was very similar for all three treatments, but by week 6 the heated cottonseed group appeared to be producing more milk than the other two groups. By the end of week 11, cumulative milk production averages for the control, unheated and heated cottonseed groups were 38.2, 38.1 and 39.4 kg/cow/day.