Replacement Report

Calf Starter Research
Comparison of Fiber Sources with Different Digestibilites and Particle Sizes

Four starters were formulated with different compositions and sources of fiber, but equal in energy, protein, minerals, and vitamins. The control starter (CON) was highest in non-fiber carbohydrate (NFC; 50%), while the other 3 starters were formulated at 40% NFC. Fiber sources were 15% beet pulp (BEET), 20% whole cottonseeds (WCS), and 12% cottonseed hulls (CSH), and were included to provide a similar amount of bulk (based on bulk density). Wheat midds and fat were used to equalize NFC and energy content of the 4 starters. Energy content of starters was estimated using NRC (2001) tabular energy values (Ne_g) of ingredients. In starters WCS and CSH, the cottonseed and cottonseed hulls were not included in the pellet to take advantage of their large particle size. The corn used in each starter was ground (692 microns) to remove differences in corn particle size. The statistical contrasts were: high vs. low NFC (CON vs. others), digestible fiber vs. undigestible fiber (WCS vs. CSH), and dietary particle size (BEET vs. WCS, CSH).

Forty calves (89 lb) were housed in individual pens bedded with straw. Calves had access to clean fresh water and dry starter feed at all times. One lb of a 20% milk protein, 20% fat milk replacer was fed daily divided into 2 feedings. Calves were weaned at 6 weeks. The nursery was naturally ventilated with no heat. Starter feed offered and refused was weighed daily. Feces were scored daily using a 1 to 5 scale with 1 being normal and 5 being watery. Medical treatments were recorded daily. Calves were weighed initially and weekly. Body condition score (1 being thin and 5 being obese) and hip widths were measured initially and at 6 and 8 weeks. Data were analyzed as a completely randomized design using logical contrasts statements (see above) to separate the means.

Calves fed CON had better feed efficiencies (milk replacer plus starter divided by gain; Figure 1) and higher fecal scores (Figure 2) for 0 to 6 weeks and 0 to 8 weeks than calves fed the other starters. Calves fed BEET had fewer cumulative medical days from 0 to 8 weeks than calves fed WCS and CSH, and appeared lowest of all treatments. These differences appeared to accumulate after week 4.

There was no apparent sorting of the starters. Calves fed WCS tended to have the lowest gains (Figure 3). Manure from all of the calves fed WCS was rinsed with water through a .0937 $inch^2$ sieve on the last 2 days of the trial and no whole cottonseeds were retained, indicating the calves were masticating and possibly digesting them. Possibly, the gossypol from the whole cottonseed was negatively affecting the calves. Calves fed CON and WCS tended to have the lowest intake of starter (Figure 4). The better feed efficiencies of calves fed starter CON could indicate that high NFC (starch from corn) was better utilized than the fiber sources. Possibly tabular energy values of the fibrous feeds and fat source were incorrect (high) for neonatal calves, penalizing the low NFC starters. No calves bloated during the trial. Two calves fed CSH scoured around days 48 to 51, increasing that treatment's average medical days and fecal score, but these sicknesses did not

appear to be related to acidosis or bloat (likely an enteritis). Sometimes, nutritionists choose to use fibrous feeds to reduce the risk of rumen acidosis and bloat, especially if the starter is going to be feed for several weeks post-weaning. These data might suggest that beet pulp and cottonseed hulls are potentially useful for that purpose and more useful than whole cottonseed. Fecal scores appeared to bear this out, with higher fecal scores recorded for calves fed the CON starter. However, this would have been better determined had the trial been continued beyond 8 weeks.

In conclusion, the high NFC starter with the highest ground corn content (CON) was used more efficiently by neonatal calves than the three more fibrous starters. Physiologically, this is logical because the digestive capacity of the rumen is very limited in neonatal calves and the digestive enzyme system of the calf is best suited for starch and lactose digestion. Additionally, NRC (2001) energy values used for the fibrous feeds are based on research with older animals and are likely over-estimates for neonatal calves.

Figure 1. Feed efficiency of calves fed 4 starters

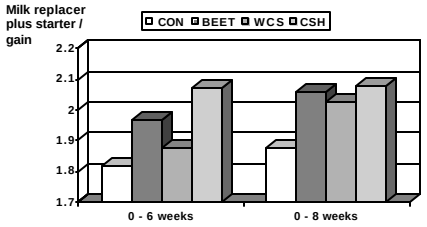

Figure 2. Fecal score of calves fed 4 starters

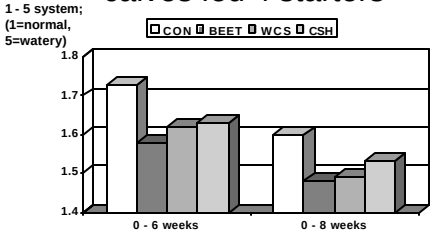

Figure 3. Daily gain of calves fed 4 starters

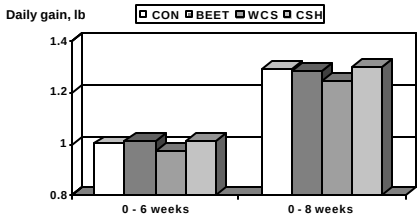

Figure 4. Starter intake of calves fed 4 starters