

**FEEDING DIVERSE BIOLOGICAL TYPES
OF CATTLE: HOW TO PRODUCE LEAN,
UNIFORM, PALATABLE BEEF - PROFITABLY**

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The beef industry is in the midst of an era of great change. For the first time, the industry is striving to produce the type of beef that consumers want to buy. The old system where cattle were sold "on the average" is evolving toward a system of premiums and discounts in which prices will more accurately reflect the true value of the carcass. Cattle feeders must take steps to produce the type of cattle that will be most profitable.

Table 1 presents average carcass data of cattle slaughtered in 1985 and 1987 (more recent data are not available) along with a suggested list of specifications for carcasses of the future. While some progress has been made, the average carcass does not meet ideal specifications for cutability and quality. One improvement that must be made but is not pointed out in Table 1 is that carcasses must become more uniform in terms of weight, muscling, fat content and marbling.

The demand for increased uniformity comes at a time when the U.S. cattle population is more diverse than ever before. As figure 1 illustrates, there was a time when the cattle population contained very little variation and product requirements were broad - virtually all carcasses had equal value. The current situation is just the opposite. Breeds have been imported and synthesized, and selection has increased within breed variability, but product requirements have narrowed. It is anticipated that penalties will soon become severe for producing beef that does not fit these narrowing specifications.

Both genetics and environment/management must be changed to produce the beef of the future. This paper will review pertinent literature to describe the feedlot performance and carcass characteristics of different breed types and in different feeding systems. Hopefully, cattlemen will

be able to adjust in order to meet their goal: To produce lean, uniform, palatable beef - profitably.

The main questions that are asked are: How do cattle of different frame sizes perform in different feeding systems? What energy level should be fed? Should cattle be backgrounded? How long should they be fed?

GENETICS

Crossbreeding systems. Properly designed crossbreeding systems are essential for modern beef production. The strengths and weaknesses of the breeds used must complement each other (breed complementarity) so that the composite animal that results meets certain performance and carcass specifications without an excess or insufficiency of any given trait. In designing future crossbreeding systems, whether rotational or terminal, carcass traits must be given higher priority than they have traditionally received. While growth and fertility are of the utmost economic importance, carcasses that do not meet specifications for weight, cutability or quality will likely be drastically discounted, thus enhancing the economic importance of carcass traits. Planned crossbreeding, instead of simply changing the breed of bull purchased each year, must be practiced. Uniformity of end product (feeder calves or carcasses) must be considered in any breeding scheme.

Frame size. The effect of frame size on growth rate and profitability is shown in Tables 2 and 3. Rate of gain increased with frame size but profit plateaued when yearling height reached 47".

It is important to realize, however, that frame size is not always an accurate predictor of performance. A recent study at Michigan State University points that out clearly. Two groups of cattle with similar frame scores were fed. One group was an unselected line, the other group was from a herd that had selected heavily for growth, but not frame size, for several generations. Over a 221 day feeding period, the selected cattle out-gained the unselected cattle 3.1 lb per day to 2.4 lb per day. This 29% advantage in rate of gain produced 155 more pounds of gain per head in the selected group although frame size was similar. Certainly frame size can be an accurate predictor of the weight at which steers will finish. However, cattle feeders should strive to obtain cattle from herds that have selected for performance, rather than assuming that frame size will assure rate of gain.

Muscling. Muscle has become a buzzword in the industry in the past few years. From packers to show ring judges, nearly everyone is extolling the virtues of muscular cattle as if they had just discovered the first ones. In reality, the industry should be reprimanded for producing too many light muscled cattle for decades. The future, however, includes muscular cattle. Whether or not premiums will be paid for muscular carcasses remains to be seen but it is clear that deep discounts assigned to light muscled carcasses. Carcasses with less than 1.6 square inches of rib eye area per 100 lb carcass weight will be penalized severely, those with less than 1.8 may also be discounted. Since current industry average is approximately 1.8, it is clear that something must change. Crossbreeding systems will place greater emphasis on muscling through selection of muscular

bulls as well as some emphasis on muscling in replacement females. This will affect both within and among breed bull buying decisions on the part of cow-calf producers.

Research has examined the performance and cutout differences in cattle varying in muscularity. Feeder calves representing the three USDA feeder calf muscle scores (1-3, 1 is most muscular) and frame sizes (large, medium and small) were fed to slaughter. Heavy muscled feeder calves grew faster and more efficiently and had higher carcass yields (Tables 4 and 5) than light muscled calves. Muscle/bone (M/B) ratio may be used by packers to determine carcass value. While feeder calf muscle score dramatically affected M/B (Table 6), frame size did not.

MANAGEMENT

Accelerated beef production systems. Table 7 includes data from an investigation into some of the important questions. Researchers in Kansas fed Angus x Hereford (A x H) steers and crossbred steers [3/8 Simmental, 1/4 Chianina, 3/8 British breeds (S x C)]. One-half of each breed group was placed directly in the feedlot at 8 months of age and fed a high energy diet for 140 days (A x H) or 180 days (S x C). This was an accelerated production system. The remaining 1/2 of each breed group was fed in a conventional system including a backgrounding phase and a finishing phase. Within each breed group, the accelerated program produced faster, more efficient gains and lighter, leaner carcasses with lower yield grades but smaller rib eyes. While the quality grades of the accelerated program steers were lower, palatability of the accelerated program carcasses was equal to or greater than the conventional program steers.

Given the prices listed in the footnote, accelerated S x C cattle were the only profitable group. Their advantage was greatest when a premium was paid for carcasses leaner than yield grade 3.5. In this particular study, the conventional program A x H cattle, a system designed to mimic typical U.S. beef production, were yield grade 4.0 with only select+ quality grade. This is a rather unusual yield/quality grade relationship and may partly account for the poor showing of that group. Nevertheless, some conclusions can be drawn from this study. First, the accelerated system produced beef more efficiently than the conventional system. Second, if cattle are slaughtered when they grade select, large framed, crossbred cattle will be more profitable than A x H cattle. Third, the conventional system does not produce more palatable beef than the accelerated system, despite higher quality grades. Finally, premiums and discounts based on weight, yield or quality grade may affect large framed crossbred cattle more than British breed cattle.

An important advantage of accelerated beef production systems is the increased rate of gain observed when cattle are fed high energy diets. Table 8 illustrates the relationship between rate and efficiency of gain. As feed intake above that required for maintenance is increased, gain becomes more efficient due to a dilution of maintenance cost. This is one reason why fast gaining cattle are usually more efficient than those that gain slower. The lower interest cost (per herd) due to a shorter period of ownership is another advantage of accelerated production systems.

How long should cattle be fed? The same Kansas State University research group conducted another experiment to compare various lengths of the feeding period in an accelerated system for Simmental-crossbred steers. They also included a conventional system in this study. Results are in Table 9. Based on these data, they concluded that there was no advantage to feeding cattle for longer than 178 days. Other studies have concluded that 120-150 days of feed will produce maximum palatability and that efficiency will decline after that time.

Recent research conducted at Michigan State University supports this claim. Steers of five different breed types, ranging from very small to very large, were fed for 146, 183 or 221 days. Steaks from these steers were evaluated by a taste panel. No substantial improvements in palatability were observed after 146 days on feed.

Carcass fat content should also be considered when deciding how long to feed cattle. Parrett et al. (1985) used an ultrasound device to estimate fat thickness in live cattle and slaughtered them when they attained .2, .4 or .6" of backfat (Table 10). As fat thickness increased, rate of gain decreased, feed conversion became poorer and cutability decreased. While quality grade increased, taste panel acceptability did not change significantly. As cattle were fed from .2 to .4" of fat, 68.0% of the carcass weight gain was fat and only 28% was lean. As cattle were fed from .4 to .6" of fat thickness, 72% of carcass weight gain was fat and only 25.5% was lean. As cattle progressed from .4 to .6" of fat, deposition of 1 lb of lean required 23% more feed than between .2 and .4".

Bulls versus steers. An easy, effective means to improve composition of gain would be to feed male calves as bulls, rather than as steers. Table 11 includes data from a study that compared bull to steers slaughtered at the same age as bulls (Steers I) or at the same slaughter weight as the bulls (Steers II). These cattle were purebred or high percentage Simmental, frame score 6.0 and were placed on feed at 8 months of age.

Performance of the bulls was superior to both groups of steers, even though performance of the steers was exceptional. An interesting point is that daily carcass fat gain of the bulls (.96 lb) was nearly equal to the daily fat gain of the steers (1.04 and 1.03 lb for Steers I and Steers II, respectively). The huge advantage in carcass leanness of the bulls is due, then, to greater lean gain per day, rather than less fat gain. It is critical that the industry find a means to select for greater LEAN GAIN PER DAY, rather than selecting for specific carcass endpoints.

Although steers had higher quality grades than bulls, there are numerous reports which indicate that bulls that are less than 16 months old, if fed a high energy diet for at least 120 days, will produce highly palatable beef, despite low quality grades. There are numerous reasons why very few bulls are fed for beef in this country (most slaughter cattle in Europe are bulls) but resistance is diminishing and bull beef may have a future in the U.S.

Table 12 includes other interesting data from the bull/steer comparison. One-half of the steers were slaughtered at the peak of their daily gain curve, after 167 days on feed (same time/age as

the bulls) the other 1/2 then they attained the same weight as the bulls (57 days later). As the steers gained from 1210 lb to 1362 lb, and progressed from select+ to choiceE quality grade, rate of gain decreased and feed conversion became poorer. More importantly, only 3.9% of carcass dry matter gain was protein, 96.1% was fat. Obviously the last few months on feed decrease the efficiency of the beef industry.

The data of other studies discussed here indicates that beef from Steers I (167 days on feed but not choice quality) would have been equally palatable to that from Steers II (224 days on fed, choice quality). Clearly, a move away from choice levels of marbling could improve efficiency of the industry. However, this would be beneficial only if palatability could be maintained.

EXOGENOUS CARCASS MODIFIERS

Research over the past few decades has resulted in greater understanding of the endocrinological control of growth. As a result, several growth promotants and carcass modifiers are currently available to cattlemen or are being developed.

Steroid implants. Steroid implants are used extensively to improve rate and efficiency of growth. Table 13 lists those that are currently used in the industry, although not all compounds listed are used in the U.S. Table 14 includes performance data from the only study that has compared all compounds directly. While the traditional compounds are effective, a recently approved compound (Finaplix) is more effective in heifers and a compound that is not yet approved in the U.S. (Revalor, which is used in other countries) is more effective in steers or heifers. Other studies have shown that Finaplix and Revalor increase carcass muscling to a greater extent than the traditional implants.

Beta-adrenergic agonists (BAA). BAA are compounds that mimic some actions of adrenaline in the body. When administered to laboratory or food producing animals, they dramatically increase lean/fat ratio of the carcass, improve feed conversion and often increase growth. Table 15 summarizes the results of several studies of BAA administration to a variety of species.

BAA are orally active so they can be administered as feed additives. Typical strategy would be to feed BAA for the final 4-6 weeks of the feeding period. Use of BAA will likely require alteration of typical feedlot diets. Research has demonstrated that pigs respond favorably to BAA only when protein (or lysine) content of the diet is increased.

No BAA are currently approved for animal use.

Bovine somatotropin (bST). BST, also called bovine growth hormone (bGH), is a hormone that is produced naturally by cattle. Relatively few studies have been completed in beef cattle but bST has been shown to increase growth, nitrogen retention (an indicator of muscle deposition) and carcass leanness. When dairy cattle are injected with exogenous bST, milk production is increased dramatically. Treatment of pigs with porcine somatotropin results in improvements in

growth and carcass composition that are similar to BAA administration, effects of bST on cattle may be similar as well.

As yet, use of bST requires periodic injections which dictates greater labor cost than use of BAA. Furthermore, the public uproar caused by use of bST in dairy cattle may well spill over into the beef industry. Although the product has been proven safe, there is a chance that it may not be used.

VALUE BASED MARKETING

After decades with virtually no change, the past few years have brought the beginning of a revolution in the way that fed cattle and meat are merchandised. Packers are seeking to price cattle based on what they are worth, rather than pricing them all the same. Combined with changes in consumer preference, this has caused the industry to re-think traditional ideas about which cattle are most valuable. Thus, the industry striving to identify those cattle that will generate the most consumer dollars and to develop a system of premiums and discounts that will value cattle accordingly. Changes in the pricing structure for fed cattle have already begun to affect cattle feeders.

Hot fat trimming. The push toward value based marketing will likely bring widespread use of hot fat trimming (HFT). Instead of trimming fat only during the fabrication process, HFT involves trimming carcasses of all external fat in excess of 1/4" (a typical endpoint) just after slaughter. Kidney, pelvic and heart fat (KPH) and cod or udder fat are also trimmed in most cases. This process has several advantages. First, a large quantity of fat, as much as 100 lb in some cases, is trimmed while still warm, thereby avoiding the energy cost of chilling the fat while on the carcass. Secondly, the fat is much easier to trim while warm and while the carcass is intact, thus labor cost is lowered. A third advantage is that carcasses can be sold based on their trimmed weight, rather than simply using the hot carcass weight, thus production of excess fat is not rewarded.

Table 16 lists the percentage of carcass weight that would be expected to be trimmed from carcasses representing different yield grades. A 700 lb, yield grade 3.0 steer carcass, which would not be considered extremely fat, would have 74 lb of fat trimmed if HFT was utilized. Perhaps this should alert us that a Y.G. 3 carcass is not particularly lean. Table 17 describes the relationship between Y.G. and composition in greater detail. Tables 18 and 19 indicate that as time on feed (and Y.G.) increases, HFT loss increases but fabrication loss and trimmed dressing percentage do not change.

Table 20 describes the expected change in dressing percentage (DP) that would result from HFT. In this example, HFT equalizes DP across yield grades. As days on feed (and thus carcass fatness) increase, the percentage of live weight that is removed during HFT also increases but DP of the trimmed carcass does not change. Apparently, as cattle fatten, the increase in bone and muscle weight parallels the increase in live weight. Fat is deposited at an increasing rate. This

results in increased DP but the increase is solely due to fat.

Table 21 and 22 illustrates the effect of muscling of HFT yields. Differences in untrimmed carcass DP are maintained after HFT. Put another way, the decrease in DP due to HFT is similar among carcasses that are equal in fatness even if they differ in muscling.

Hot fat trimming has not yet been widely adopted by the industry. A major obstacle to widespread use of HFT is that HFT carcasses cannot be yield graded. They can be assigned a quality grade, since quality and yield grades were uncoupled by USDA in April, 1989. Also, no pricing structure exists for HFT carcasses. Major packers, however, are in the midst of research designed to determine value after HFT. Seam fat, the fat located between muscles, poses another problem. Since HFT only removes external fat, seam fat, which is the single largest fat depot in many cases, is not removed. As a result, after HFT carcasses can appear lean due to removal of external fat while hiding great quantities of fat internally as seam fat. Since fat is a good insulator, there has been some concern on the part of packers and retailers that removal of external fat prior to chilling carcasses may result in rapid temperature decline in the cooler. This can increase toughness due to a condition known as cold shortening or cold toughening. Preliminary research has shown that this is not a problem if 1/4" of fat is left on the carcass.

It is expected that widespread use of HFT is inevitable despite potential problems. Cattle feeders should be aware of major changes that this would bring. Clearly, marketing would be affected. Shorter feeding periods may result and the type of cattle that receive the highest prices could change dramatically.

SUMMARY

Significant changes are occurring in the beef industry that will affect the type of cattle that are fed and the feeding strategies. Current recommendations would be to place large framed cattle in the feedlot as early as possible and feed them a high energy diet for at least 120 days. If forage is available, small framed cattle should be fed a moderate energy diet before finishing if the cattle are too small to reach acceptable carcass weight without this backgrounding period. Forage availability, relative cost of various feedstuffs, interest cost, availability of feeder cattle and packer preference will determine what type of cattle will be most profitable to feed and which feeding program should be utilized. Cattle feeders should pay very close attention to carcass prices based on weight, yield grade and quality grade. As premiums and discounts become more substantial, cattle feeding in the future will be characterized by much more specific target endpoints than in the past.

TABLE 1. THE AVERAGE INDUSTRY ANIMAL (1985 AND 1987) VERSUS POSSIBLE FUTURE SPECIFICATIONS FOR RETAIL BEEF

Item	<u>Average industry animal</u>		Future retail beef
	1985	1987	

Weight:			
Carcass	695	685	650-800
Live	1140	1125	1050-1300
Fat thickness, in.	0.6	0.5	0.2 to 0.5
Rib eye area, sq. in.	12.5	12.5	12 to 16
Rib eye/cwt carcass, sq. in.	1.8	1.8	1.8 to 2.2
Muscle score	???	???	1 + preferred
Yield grade	3.35	2.95	3.0 or leaner
Quality grade	Ch-	Se+	Ch-
Slaughter age	???	???	14 to 24 mo.

Based on USDA data.

FIGURE 1.

PAST:

3 BREEDS
SLIGHT VARIATION

PRODUCT
REQUIREMENTS

PRESENT:

71 BREEDS
GREAT VARIATION

PRODUCT
REQUIREMENTS

Source: Hillier, 1986 - Angus Profit Conference.

TABLE 2. GAIN, CARCASS TRAITS AND NET RETURN OF KANSAS FUTURITY STEERS BY FRAME SIZE

Yearling ht, in.	ADG, lb	Carcass wt, lb	Quality grade	Yield grade	Net profit, \$
37-39	2.58	571	ChE	2.5	53
39-41	2.75	604	ChE	2.6	61
41-43	2.84	634	Ch-	2.6	61
43-45	3.08	672	Ch-	2.5	65

45-47	3.24	716	Ch-	2.4	76
47-49	3.37	757	Ch-	2.4	83
49-51	3.43	777	Se+	2.2	86
51-53	3.50	801	Se+	2.2	85

Source: Lambert, 1984 - J.A.S. 59(1):89.

TABLE 3. FEEDER CALF GRADES - AVERAGE DAILY GAIN^a

Frame size	ADG, lb
Large	2.97
Medium	2.75
Small	2.49

^a J.A.S. 62:121.

TABLE 4. FEEDER CALF GRADES - % MUSCLE^a

Frame size	Muscle score			Avg
	1	2	3	
Large	66.7	63.8	62.5	64.4
Medium	63.0	59.9	60.2	61.0
Small	60.0	58.2	58.2	58.8
Average	63.4	60.8	60.5	

^a J.A.S. 62:121.

TABLE 5. FEEDER CALF GRADES - % MUSCLE, ADJUSTED TO 22% CARCASS FAT^a

Frame size	Muscle score			3	Avg
	1	2			
Large	62.4	61.7		60.1	61.5
Medium	62.2	61.3		61.0	61.5
Small	61.9	61.5		61.0	61.5
Average	62.2	61.5		60.7	

^a J.A.S. 62:121.

TABLE 6. FEEDER CALF GRADES - MUSCLE/BONE RATIO^a

Frame size	Muscle score			3	Avg
	1	2			
Large	3.99	3.76		3.32	3.68
Medium	3.94	3.70		3.57	3.73
Small	3.86	3.74		3.57	3.72
Average	3.93	3.73		3.48	

^a J.A.S. 62:121.

TABLE 7. PERFORMANCE, CARCASS DATA AND ECONOMIC ANALYSIS OF DIFFERENT MANAGEMENT SYSTEMS

Item	Accelerated		Conventional	
	A x H	S x C	A x H	A x C
Backgrounding, d			140	183
Finishing, d	140	180	116	122
Total days	140	180	256	305
Slaughter wt, lb	946	1116	1170	1300
Total ADG, lb	2.62	2.06	2.36	2.40
ME/lb of gain, Mcal	8.9	8.1	10.6	11.1
Carcass wt, lb	578	662	700	784
Fat thickness, in.	.51	.28	.60	.35
Rib eye area, in. ²	10.2	12.2	10.5	13.4
Yield grade	3.3	2.3	4.0	2.7
Quality grade	Se-	Se-	Se+	Se+
Tenderness	6.6	6.8	6.3	6.1
Juiciness	6.2	6.4	6.3	6.2
Flavor	6.6	6.6	6.5	6.3
Profit [loss] ^a	[\$14.55]	\$68.03	[\$56.69]	[\$11.76]
Profit [loss] ^b	[\$29.12]	\$ 9.99	[\$58.89]	[\$62.22]

^a Choice = \$100/cwt, Select = \$96/cwt, Standard = \$92/cwt; " \$9/cwt per yield grade above or below 3.5.

^b Same prices with \$8/cwt discount for Y.G. 4 or 5, \$2/cwt premium for Y.G. 1 or 2, \$2/cwt discount if not between 600 and 850 lb.

Source: Dikeman, 1985 - J.A.S. 61:137.

TABLE 8. EFFECT OF FEED INTAKE AND RATE OF GAIN ON FEED EFFICIENCY

Weight, lb	ADFI, lb	Maintenance feed	ADG, lb	Feed conversion
600	12.0	6.08	1.83	6.57
600	14.0	6.08	2.38	5.89
600	16.0	6.08	2.90	5.52
600	18.0	6.08	3.40	5.30
600	20.0	6.08	3.88	5.16

Source: Wagner, 1972.

TABLE 9. ACCELERATED BEEF PRODUCTION WITH SIMMENTAL-CROSSBRED STEERS

	Group			
	I	II	III	IV
Growing, d	0	0	0	110
Finishing, d	139	178	242	174
Slaughter wt, lb	965	1083	1220	1302
ADG, lb	2.71	2.82	2.67	2.51
Feed/gain	6.16	5.87	6.63	7.00
ME/gain Mcal/lb	8.35	7.98	9.07	8.50
Carcass wt, lb	579	683	785	782
Fat thickness, in.	.72	.35	.43	.49
Rib eye area, in. ²	10.7	11.5	12.8	12.7
Yield grade	2.3	2.6	2.9	3.1
Quality grade	Se-	Se-	Se+	Se+
Fat %	27.1	26.8	31.2	33.5
Protein, %	16.6	16.1	15.6	15.1
Flavor	6.2	6.3	6.2	6.5
Juiciness	5.9	6.2	6.0	6.4
Tenderness	6.5	6.6	6.0	6.4

Source: Dikeman, 1985 - J.A.S. 61:573.

TABLE 10. FEEDLOT PERFORMANCE AND CARCASS COMPOSITION OF STEERS
SLAUGHTERED AT THREE FAT THICKNESS ENDPOINTS

Trait	Fat thickness endpoint, in.		
	.2	.4	.6
Average daily gain, lb	3.08	2.84	2.73
Days on feed	114	168	208
Feed/gain	6.39	6.97	7.59
Carcass wt, lb	554	653	729
Fat thickness, in.	.22	.41	.62
Rib eye area, in. ²	8.5	9.5	10.8
Yield grade	2.6	3.2	3.7
Retail cuts, %	49.2	45.7	42.0
Quality grade	Se-	Ch-	ChE
Taste panel acceptability	6.7	7.0	7.0
Fat, %	28.0	33.6	37.6
Lean, %	56.1	52.4	49.6
Bone, %	15.9	14.0	12.8

Source: Parrett, 1985 - J.A.S. 61:436, 442.

TABLE 11. A COMPARISON OF BULLS AND STEERS

	Bulls	Steers I	Steers II
Days on feed	167	167	224
Slaughter wt, lb	1368	1210	1362
ADG, lb	4.05	3.44	3.24
Feed/gain	4.57	5.24	5.94
Carcass wt, lb	833	726	815
Fat thickness, in.	.23	.30	.44
Rib eye area, in. ²	15.9	13.7	14.7
Yield grade	1.5	2.0	2.6
Quality grade	Se-	Se+	ChE
Carcass fat, %	22.7	28.1	32.1
Carcass protein, %	16.6	15.5	14.7
Fat gain, lb/d	.96	1.04	1.03
Protein gain, lb/d	.44	.34	.28
Protein (% of DM gain)	32.1	24.6	21.4

Source: Anderson, 1988 - Anim. Prod. 47:493.

TABLE 12. STEER PERFORMANCE: 637-1210 LB AND 1210-1362 LB

	637-1210 lb	1210-1362 lb
ADG, lb	3.44	2.64
Feed/gain	5.24	8.01
Carcass fat gain, lb	.96	.85
Carcass protein gain, lb	.44	.03
Protein (% of DM gain)	32.1	3.9

Source: Anderson, 1988 - Anim. Prod. 47:493.

TABLE 13. STEROID ANABOLIC AGENTS USED AS IMPLANTS IN THE CATTLE INDUSTRY

Trade name	Chemical component(s)	Approved in U.S.?
Compudose	Estradiol	yes
Ralgro	Zeranol	yes
Synovex-S/Steer-oid	Estradiol + progesterone	yes
Synovex-H/Heifer-oid	Estradiol + testosterone	yes
Finaplix	Trenbolone acetate (TBA)	yes
Forplix	TBA + zeranol	no
Revalor	TBA + estradiol	no

TABLE 14. COMPARISON OF IMPLANTS IN YEARLING STEERS

Compound	68d		109d	
	ADG, lb	Increase, %	ADG, lb	Increase, %
Control	2.05		2.71	
Finaplix	2.36	+10.8	2.75	+1.8
Ralgro	2.38	+12.7	2.80	+2.7
Synovex-S	2.47	+16.8	2.90	+6.8
Compudose	2.49	+18.4	2.91	+7.2
Forplix	2.56	+21.7	2.95	+9.1
Revalor	2.64	+25.8	3.02	+11.1

TABLE 15. TYPICAL EFFECTS OF BAA ADMINISTRATION TO FULL-FED, MARKET WEIGHT ANIMALS

Growth	increased 0-15%
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Efficiency	improved 10-20%
LD muscle area	increased 10-30%
Carcass pro (muscle)	increased 5-20%
Carcass fat	decreased 15-40%
Energy expenditure	increased 20-30%

TABLE 16. HOT FAT TRIMMING^{a,b}

Yield grade	Steers	Heifers
	----- % of carcass wt -----	
1.0	5.48	6.82
1.5	6.75	8.09
2.0	8.03	9.37
2.5	9.30	10.64
3.0	10.57	11.91
3.5	11.85	13.19
4.0	13.12	14.46
4.5	14.40	15.74

^a J.A.S. 67:881.

^b Fat trimmed includes sc fat >.25 in., all KPH fat, all cod or udder fat.

TABLE 17. FAT TRIM OF CARCASSES WITH VARYING YIELD GRADES^a

	YG 2		YG 3		YG 4	
	Str	Hfr	Str	Hfr	Str	Hfr
Major cuts, %	40.4	38.3	41.1	36.7	34.9	35.0
Hot fat trim, % ^b	8.8	10.3	10.7	13.7	14.8	16.2
Fab fat trim, %	8.6	10.0	10.3	10.1	12.5	10.5
Total fat trim, %	17.4	20.3	21.0	23.9	27.3	26.8
Total fat trim, lb ^c	121.6	141.9	147.1	167.0	191.0	187.3

^a J.A.S. 67:881.

^b Includes all sc fat >.25 in., all KPH fat and all cod or udder fat.

^c 700 lb carcass.

TABLE 18. EFFECT OF TIME ON FEED ON HFT YIELD^a

Item	Days on feed		
	84	112	140
Fat thickness, in.	.34	.43	.50
REA, in. ^a	12.1	13.1	13.7
Yield grade	2.3	2.5	2.8
Quality grade	Se+	Ch-	Ch-
Live wt, lb	1036	1138	1209
Carcass wt, lb	629	687	752
Dress, %	60.7	60.4	62.2
HFT, lb	37.2	48.5	56.4
HFT, % of live wt	3.6	4.2	4.7
Trimmed dress, %	57.1	56.2	57.5

^a J.A.S. 67:2669.

TABLE 19. EFFECT OF DAYS ON FEED ON CARCASS FABRICATION^a

Item	Days on feed		
	84	112	140
	----- % of live wt -----		
Trimmed, boneless product	43.1	42.8	44.0
Hot fat trim	3.6	4.2	4.7
Fab fat trim	4.3	4.2	4.3
Bone trim	9.7	9.3	9.2
	----- % of carcass wt -----		
Trimmed, boneless product	71.1	70.7	70.7
Hot fat trim	5.9	7.0	7.5
Fab fat trim	7.1	6.9	6.9
Bone trim	16.0	15.3	14.9

^a J.A.S. 67:2669.

TABLE 20. EFFECT OF HOT FAT TRIMMING ON DRESSING PERCENTAGE^a

Yield grade	Dress % ^b	Trimmed dress %	Change
1	60.0	56.5	-3.5
2	61.3	56.7	-4.6
3	62.7	56.6	-6.1
4	64.0	55.9	-8.1

^a J.A.S. 67:881, steers and heifers.

^b Estimated, actual values not given.

TABLE 21. EFFECTS OF MUSCLE THICKNESS ON HFT YIELDS^a

Item	Muscle score	
	1	2
Fat thickness, in.	.40	.44
REA, in. ^a	14.0	11.9
Yield grade	2.3	2.8
Quality grade	Ch-	Ch-
Live wt, lb	1144	1111
Carcass wt, lb	715	664
Dress, %	62.5	59.7
Trimmed carcass wt, lb	667	617
Trim wt, lb	48	47
Trimmed dress, %	58.3	55.6
Dress % lost	4.2	4.1

^a J.A.S. 67:2669.

TABLE 22. EFFECTS OF MUSCLE THICKNESS ON CARCASS FABRICATION^a

Item	Muscle score	
	1	2
	----- % of live wt -----	
Trimmed, boneless product	44.7	41.9
Hot fat trim	4.2	4.2
Fab fat trim	4.5	4.0
Bone trim	9.1	9.7
	----- % of carcass wt -----	
Trimmed, boneless product	71.5	70.2
Hot fat trim	6.7	7.1
Fab fat trim	7.2	6.7
Bone trim	14.6	16.2

^a J.A.S. 67:2669.