THE IMPACT OF LIMIT FEEDING, SEASON AND TYPE OF CATTLE ON IMPLANT RESPONSE

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ABSTRACT

The impact of animal type, season and intake level on implant response is of obvious interest and concern to most involved the beef industry. However, scientific data and information in these areas is lacking. Maintenance requirement is one area where each of these items may interact with implants to affect the implant response. Other factors possibly involved are discussed. Although the data, ideas, and theories in this paper should not be considered as infallible facts, they may provide a basis for further discussion and research.

INTRODUCTION

When asked to speak on this topic, I indicated that I was not qualified because I had more questions than answers and little scientific data on this subject. I was told others felt the same, so I got this topic by default. Certainly, it is a fascinating subject of obvious importance. I will discuss factors which may explain how cattle type, season and limit feeding could impact the implant response; you can draw your own conclusions.

For discussion, implants will be divided into three categories. The first is implants with estrogen is activity such as Synovex S & H, their generic counterparts, and Compudose and Ralgro. The second category is implants with androgenic activity such as Finaplex S & H. The third category is the combination (estrogen and androgen) implants that include Revalor S, H and G and Synovex Plus. Each of these implant categories has a proven track record. In spite of management and genetic changes that have taken place in our cattle industry over the years, implant efficacy remains very good. A recent summary of feedlot implant trials indicated a gain increase of 18% and a feed efficiency improvement of 9% using various implants combinations (4). While implant response on pasture is somewhat less, there still is a sizable response when feed and pasture conditions are adequate.

Both similarities and differences between implant categories exist with respect to physiological effects on the animal. These include:

1. Estrogen, androgen and combination implants stimulate muscle and bone disposition.

2. All implant categories improve gain and feed efficiency; the combination implants usually are most effective.

3. Estrogen implants increase feed intake; but androgen implants may not.

4. Estrogen implants increase the maintenance requirement while androgen implants may decrease the maintenance requirement for energy.

To set the stage for further discussion, I would like to make some additional general observations. Some of these observations are supported by scientific data; others are theoretical and opinions based on years of personal experience. I suspect that all readers may not agree with all observations; this is as it should be. If each of us agreed on everything, some of us would be unnecessary. These general observations include:

1. There is a seasonal or day length effect on feed intake (3, 6). Numerous studies have shown that intake is maximum with approximately 16 hours of darkness and 8 hours of light (Tables 1 & 2). These day-length categories, even though created artificially, correspond closely to summer and winter day lengths.

Table 1.

TREATMENT*	GAIN (LB/DAY)	FEED INTAKE (LB/DAY)	CONV.
RAM (16L : 8D)	0.90	3.88	4.3
RAM (8D : 16L)	0.75	3.37	4.5
WHETHER (16L : 9D)	0.76	3.50	4.6
WHETHER (8L : 16D)	0.66	3.17	4.8

Table 2.

TREATMENT	GAIN (LB/DAY)	FEED INTAKE (LB/DAY)	CONV.
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Table 3. Seasonal Effect on Performance.

	STEERS		HEIFERS	
	APRIL	AUGUST	APRIL	AUGUST
ADG	2.62	3.05	2.34	2.71
CONV.	7.18	6.52	7.54	6.86
CONSPT	18.8	19.9	17.6	18.6

2. Intake and performance vary with season. This is verified by records kept by the Texas Cattle Feeders Association (5) which indicate that the poorest close-out performance occurs in April and the best is in August (Table 3). Cattle closing out in April are those fed during the winter season; those closing out in August are cattle fed during the spring and summer season. The performance difference is consistent and substantial. This seasonal difference has held true in each of the ten years of data that were summarized. The difference in performance favored August over April close-outs by 10 to 15%.

3. Breeds differ in maintenance energy requirements. For example, Holsteins have a maintenance requirements 7% greater than other breeds. Higher maintenance requirements also have been documented for some continental breeds. Conversely, the maintenance requirements of Brahman cattle and possibly some British breeds may be relatively lower.

4. Maintenance energy requirements are influenced by season and weather. For example, Ames & Johnson (1) estimate that maintenance requirements increase 1.3% for each degree below 20 degrees Celsius. Table 4 illustrates this effect on performance when the formula is applied to monthly temperatures that occur in Eastern Colorado. The E.A.T. refers to Effective Ambient Temperature, a wind chill index.

Table 4. Application of the 1.3%/°C rule to cows requirements and steer performance.

			Cows[a]	Steers[b]	
Month	EAT (°C)	% increase in maintenance	Increased dry matter rquirement (lb./d)	Decrease in ADG (lb./d)	Decrease in feed efficiency (lb. dry matter/lb. gain)
Jan.	-5.6	33.3	5.9	0.46	1.0
Feb.	-2.0	28.6	5.1	0.39	0.8
March	0.1	25.9	4.8	0.35	0.7
April	4.8	19.8	3.6	0.26	0.5
May	10.9	11.8	2.1	0.14	0.3
June	16.7	4.3	0.7	0.03	0.1
July	19.5	0.7	0.1	—	—
Aug.	18.3	2.2	0.4	—	—
Sept.	12.8	9.4	1.8	0.11	0.2
Oct.	6.6	17.4	3.3	0.23	0.5
Nov.	—	26.0	4.5	0.35	0.7
Dec.	-3.8	30.9	5.4	0.42	0.9

[a]525 kg. cow consuming 50% TDN diet.
[b]Yearling steer fed 85% concentrate diet.

5. Restricted intake programs probably reduce the animal's maintenance energy requirement. This may be at least partially due to the smaller organ size (liver, gut, etc.) of restricted fed animals.

6. As body fat content increases, feed consumption decreases.

7. The better the animal performance, the greater the implant response.

8. The better the pasture conditions, the greater the implant response. If pasture conditions are not adequate to support 1 lb. of gain/day or more, it is unlikely that implant responses will be consistently favorable.

Based on these general observations, one can discuss how various factors might affect the implant response. Much of this is speculation and not necessarily based on "hard scientific" evidence. Unfortunately, it is difficult to gather direct scientific comparisons, in these are areas but this does not diminish their importance. This also is an area of immense personal interest where I would encourage further research.

Breed Type

One effect of breed type on performance would be a greater implant response with better performing animals, regardless of the implant used. I would speculate that animals with higher maintenance requirements and higher feed consumption should respond better to implants containing androgen. These implants would be less likely to further stimulate intake and more likely to reduce maintenance energy requirements. Conversely, breed categories with low maintenance requirements and lower feed intakes might respond relatively better to estrogen implants. This is because any increase in maintenance energy requirements resulting from estrogen implants would be less critical and an increased feed intake would be more beneficial.

Season

We may see a greater implant response in the summer to all implants because summer performance exceeds winter performance. Nonetheless, implants still are extremely important during the winter season, a time when we need all the help we can get. Also, it is a time of decreased feed consumption and possibly, increased maintenance energy requirements. Decreased consumption and increased maintenance requirements obviously are a potential "double whammy" with respect to performance. An extremely frustrating calamity for a nutritionist or cattle owner is a severe winter when performance and consumption are depressed. Such cattle must be fed longer and as a result, implant activity may "run out". In this situation, an active implant with estrogen activity to help maintain consumption is extremely helpful. In the summer, when we have high seasonal consumption, one might expect a relatively better response to implants containing androgen.

Restricted Intake

Restricted intake growing programs have become more popular in recent years, but to my knowledge, no scientific data are available on the implant response in such programs. Restricted feeding, though somewhat controversial, is a useful tool to obtain a desired gain using an economical combination of high energy ration ingredients. Table 5 illustrates data from a previously unpublished experiment we conducted comparing Synovex S and Synovex Plus when feeding either being restricted or ad lib diets. Unfortunately, there was no negative control in this experiment. The design for the restricted phase of the trial was based on comparisons desired for the final fattening phase. As expected, gain and feed consumption were greater for the ad lib cattle; however, conversions were superior for the restricted-fed cattle. Furthermore, the best restricted performance was obtained with the combination implant (Synovex Plus) as compared to Synovex alone. This would suggest that restricted-fed cattle do respond to implants containing androgen, possibly because such implants reduce maintenance energy requirements. Even though maintenance requirements of restricted fed cattle may be lower, the maintenance portion of the dietary energy intake becomes relatively more important because total energy consumption is reduced.

The impact of implants on pasture performance provides a clue of what might be expected in restricted-fed programs. In the majority, if not all pasture conditions, energy intake is somewhat limited compared to a feedlot situation. Since we normally obtain a pasture implant response when cattle are gaining in excess of 1.0 lb./day, this suggests we still can expect an implant response under restricted energy intake conditions.

Table 5. Effect of implant types and feed intake level on grow performance.

IMPLANT TREATMENT	SYNOVEX S	SYNOVEX/PLUS	SYNOVEX PLUS
FEED TREATMENT	RESTRICTED FED	RESTRICTED FED	AD. LIB. FED
START WT.	572	573	573
FINAL WT.	845	865	912
DAYS ON FEED	103	103	103
NO. CATTLE	400	200	200
PEN REPS.	8	4	4
D. M. INTAKE/DY	14.1	14.1	18.2
A. D. G.	2.66	2.83	3.29
D. M. CONV.	5.33	4.99	5.53

Carcass Maturity Considerations

On January 31, 1997 there was a B maturity carcass grade change. Thereafter, many B maturity carcasses will no longer be eligible for choice or select grade, but rather, will grade standard. Maturity will be based on bone ossification and lean color. It is probable that changes in bone ossification will be influenced by estrogen levels. This means that an addition to chronological age, factors should as puberty, pregnancy, abortion, etc. will influence the maturity score of heifer carcasses. If estrogen levels influence bone maturity then there exist a possibility that implant type may influence carcass maturity. Furthermore, it appears that androgens or TBA implants have little or no effect on bone maturity. It's probable that there will also be a breed effect with respect to B maturity thus, this is another area where there may be a breed-implant interaction. Early maturing breeds may present more of a problem and late maturing breeds may be less of a problem. Another example is a possibility that Zebu females which are usually older when they reach puberty may be older before reaching B maturity. If one is feeding cattle which could present a B maturity problem, using implants containing TBA and a lower estrogen level may be advantageous.

LITERATURE CITED

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QUESTIONS & ANSWERS

Horn: I was interested in your idea that cattle must gain over 1 pound per day before they will have an implant response. Are there exceptions when we provide a high quality forage like wheat pasture when forage availability rather than forage quality limits intake and performance? One of the largest responses to implants that I have had was with some light weight heifers on very short wheat pasture. From a base rate of weight gain of about ½ lb a day, estrogenic implants increase ADG by 30%. Must we consider both feed quality and feed availability rather than just ADG when we consider the potential for an implant response?

Answer: I think that is a good point.