Beef Session II

Cow-Calf/Feedlot Combined

Spaying Heifers: The Whys, Techniques & Economics

Dr. Ed Wimpy, *Presiding*

Why Spay Heifers?

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The price spread between steers and heifers is the most important reason buyers purchase market heifers. To illustrate this price difference consider the following information summarized from a marketing study reported in 1979 comparing steer and heifer prices:[1]

1. The average heifer calf was worth about $58.00 less than the average steer calf due to weight and price.
2. Feeder heifers sold for about 15% less than feeder steers of similar quality.
3. Fat heifers sold for approximately 4% less than fat steers of comparative quality.
4. Heifer carcasses were valued at approximately 5% less than steer carcasses.

This price differential is a strong indication that most stocker and feeder cattle buyers have a strong preference for steers. A further look at market prices also shows that slaughter steers consistently sell for more per hundred weight than comparative fat heifers. Why?

First, there is a difference in performance. Steers out gain heifers of similar breeding in the range of 5% to 15% depending upon the stage of growth and other management factors. Heifer calves usually gain less than steers from birth to weaning and the trend continues for stocker heifers.

Pregnancy in market heifers results in a severe economic loss through the entire production cycle. One recent estimate for the feedlot industry in Colorado alone was over ten million dollars.[36] The fact that feeder heifers sell for as much as fifty dollars per head less due to pregnancy indicates the feeder's awareness of the problem. Similar effects can be seen in stocker heifers.

A comparison between feedlot heifers and steers can be made based upon a recent periodic report involving over 300,000 feeder cattle on the High Plains. Average daily gain

Feedlot Heifer/Steer Comparison[18]

	Heifer	Steer	Heifer Difference
Wt in (lb)	618	696	78 pounds lighter
Wt out (lb)	983	1106	123 pounds lighter
Days fed	142	138	4 days longer
Daily gain (lb)	2.57	2.97	0.4 less/day (13.5% less)
Feed/lb gain (lb)	8.81	8.54	0.27 more feed/lb gain
Death loss %	1.07	0.55	0.52 % higher
Gain cost ($/cwt)	50.21	48.66	1.55 $6.20 more for 400 lbs.

based upon this data is 13.5% less for feedlot heifers than steers. This reduction in gain is due not only to sex differences but is further confounded by reduced performance as a result of abortion, calving, metritis and other pregnancy related problems. The increased death loss in feedlot heifers of 0.5% from this data is also related almost entirely to problems associated with abortion and calving. In addition to the reduced performance gain, feed efficiency, and relative increases in the days on feed, add the losses that occur in dressing percentage due to the number of heifers that are pregnant at slaughter.

Effect of Pregnancy on Dressing Percentage[4]

	No. Hd.	Pregnant %	Dressing %	Difference % (lbs carcass)
Open Heifers	5004	—	63.3	— —
Pregnant Heifers	5016	23.3	62.0	1.3 (13)
Open Heiferettes	510	—	59.2	— —
Pregnant Heiferettes	507	22.9	57.8	1.4 (14)

Based upon a carcass price of $1.00 per pound, the difference between an average pregnancy rate of 23% in feeder heifers from this study could result in about $13.50 per head when compared with non-pregnant slaughter heifers.

Other losses to consider are related to increased sexual activity if heat suppressing additives are not used and animals that must be "realized" before finishing due to calving problems, prolapsing, etc.

Spaying heifers improves buyer appeal for shipment by providing compliance with interstate health requirements such as those for brucellosis and reducing feedlot processing costs related to examination for pregnancy, inducing abortion, and feeding heat suppressing additives in addition to the benefits discussed above.

Further proof that the feedlot and packing industries are aware of these problems was demonstrated in a "feeder/packer survey" conducted in 1983.[3]

Survey Question	Low	Mean	High
a. What percent of incoming feedlot heifers are pregnant?	0	16.5%	25
b. What is the average cost of pregnancy testing and abortion?	$4.75	$5.29	$6.00
c. What is the increased value of open vs. pregnant heifers on a per head basis	$10.50[ab]	$30.32	$50.00
d. What is a reasonable price spread between feeder heifers and steers?	0[c]	$5.02	$7.50
e. What percent of slaughter heifers are pregnant?	2%[d]	17%	33%
f. What is the average loss in dressing % of slaughter heifers due to pregnancy?	1%	3.38%	6%
g. What is a reasonable difference in live weight price between slaughter heifers and steers of comparable quality?	$1.00[e]	$1.50	$2.00
h. What is a reasonable difference in carcass price between heifers and steers of comparable quality and yield grade?	0	$1.89	$4.00

Comments;

a. "Exposed heifers have poor or no market value as most feeders won't bid on them."
b. "We will give $.50/cwt above market for heifers that are pregnancy checked and opens weighed back."
c. "When the spread of feeder heifers and steers is greater than $5.00, buy heifers."
d. "We generally buy from major feeders who have pregnancy tested and aborted heifers. Seasonally (spring), some farmer/feeders have high pregnancy rates."
e. "Many packers will only buy 'on the rail' and thus will not offer live bids on fat cattle to avoid excessive losses due to pregnancy.

Assuming the above statements to be reasonably accurate, there is justification for some price spread between heifers and steers. The difficulty relates to defining what the price difference should be.

Estimating Economic Advantages

Following spaying, the major drawbacks associated with market heifers have been eliminated and management is nearly identical to steers. The "buller problem" associated with steers does not occur in spayed heifers and is a definite economic and management advantage. Factors such as reduced gain in heifers can be changed through genetic improvement by the producer while the buyer must make a more critical evaluation of heifers to be purchased. Although the ability of heifers to outgain steers of identical breeding is unlikely based upon current knowledge, there are many heifers with genetic potential superior to steers of different breeding.

Performance relating to average daily gain has been summarized previously and is included following the discussion. Table 1 lists the trials where growth implants were not utilized. The non-spayed heifers outgained the spayed heifers in 22 of 27 trials. The overall difference when combined by simple average was 7.9% favoring non-spayed heifers. These results have been re-confirmed in more recent trials. Table 2 compares spayed heifers with intact controls when all were implanted. In this case 75% of the trials (13 of 15) favored the spayed-implanted heifers over intact-implanted heifers. The 7.9% difference noted above was not only recovered, but nearly an additional 2% improvement in gain was noted, again by averaging all trials. In cases where intact heifers are not implanted, as often occurs when bred heifers have been in demand, the implanted-spayed heifers in 100% of the trials (18 of 18) outgained the non-spayed, non-implanted heifers.

More recently, attempts to improve gain of spayed heifers utilizing the technique of autografting a small piece of ovarian tissue beneath the rumenal serosa has been advocated.[17] Based upon several recent trials, the spayed autografted heifers did not perform as well as the spayed-implanted heifers regardless of the spaying technique.[5 6 15 21 25 27 30 37 39] Many of the graft sites failed when examined at slaughter and no increase in plasma levels of ovarian steroids could be detected.[39] When the autografted heifers were implanted they performed similar to implanted-spayed heifers. At the present time this technique does not appear to offer any additional advantage over spayed-implanted heifers.

An additional return during and following the feeding period could be estimated due to improved performance during feeding with no abortion, fewer realizers and less death loss due to pregnancy, and no reduction in dressing percentage at slaughter due to pregnancy. This value could range from near $8.00 per head with the average number of pregnant feeders expected under good management to a moderate estimate of $20.00 per head if good feedlot abortion programs are not utilized and even much higher under other adverse circumstances. Estimates ranging from $20.00 to $40.00 per head favoring spayed heifers have been made by producers who have retained ownership through the feedlot over several years. The benefits of spaying heifers under the majority of management situations is justified from a management and economic standpoint.

TABLE 1. Gain Data Summary of 26 Trials Comparing "Spayed-Non-Implanted" and "Non-Spayed-Non-Implanted" Heifers.

Trial	Animals/Group*	Type Ration	Average Daily Gain (lbs.) Spayed Non-Implanted	Average Daily Gain (lbs.) Non-Spayed Non-Implanted	ADG Difference %	Source of Information — Year
1	5	Finishing	2.07	1.99	+3.86	Wilson and Curtis — 1896 —
2	5	Finishing	1.70	1.86	−8.60	Iowa State University
3	14	Finishing	1.89	2.15	−12.09	Gramlich and Thalman — 1930 —
4	17	Finishing	1.66	1.92	−13.54	University of Nebraska
5	12	Finishing	1.86	1.77	+4.84	Hart, et al — 1938 — University
6	12	Finishing	1.79	1.99	−10.05	of California
7	5	Finishing	1.91	2.07	−7.73	Dinusson, et al — 1950 — Purdue University
8	7	Finishing	1.80	1.87	−3.74	Clegg and Carrol — 1956 — University of California
9	6	Finishing	1.86	1.92	−3.13	Langford and Douglas — 1956 — North Dakota State University
10	10	Growing	1.45	1.74	−16.67	Smith, et al — 1957-58 — Kansas
11	10	Finishing	1.66	1.79	—7.26	State University
12	10/11	Growing	1.41	1.69	−16.57	
13	11	Finishing	1.66	1.78	−6.74	
14	10	Finishing	1.79	1.96	−8.67	Kercher, et al — 1960 —
15	10	Grazing	1.28	1.47	−12.93	University of Wyoming
16	10	Finishing	1.62	1.93	−16.06	
17	24	Growing	0.93	1.04	−10.58	Nygaard and Embry — 1966 —
18	23	Finishing	1.82	2.15	−15.35	South Dakota State University
19	16	Finishing	1.74	2.08	−16.35	Ray, et al — 1969 — University of Arizona
20	75/25	Grazing	1.94	2.07	−6.28	Cameron, et al —1977 —Montana
21	29	Finishing	2.44	2.35	+3.69	Yamamoto, et al — 1978 — Colorado State University
22	115	Finishing	3.76	3.88	−3.09	Rupp, et al — 1980 — Colorado State University
23	47	Grazing	1.55	1.56	−0.64	Rush and Reece — 1981 —
24	47	Finishing	2.06	2.04	+0.98	University of Nebraska
25	36	Grazing	1.74	1.75	−0.57	
26	36	Finishing	2.39	2.28	+4.60	
27	54/27	Grazing	1.47	1.57	−6.37	Shoop, et al — 1983 — USDA Exp. St.
27	657/579				= −7.9	

(Range from +4.84 to −16.57) (81% of trials favored Non-Spayed Heifers)
* Two values indicate unequal group size, Spayed/Non-Spayed.

TABLE 2. Gain Data Summary of 17 Trials Comparing "Spayed-Implanted" and "Non-Spayed-Implanted" Heifers.

Trial	Animals/Group*	Type Ration	Implant	Average Daily Gain (lbs.) Spayed Implanted	Average Daily Gain (lbs.) Non-Spayed Implanted	ADG Difference %	Source of Information — Year
1	24	Growing	DES	1.15	1.22	−5.74	Nygaard and Embry — 1966 —
2	24	Growing	SYN-H	1.14	1.23	−7.32	South Dakota State University
3	24	Finishing	DES	2.35	2.34	+0.43	
4	24	Finishing	SYN-H	2.25	2.30	−2.17	
5	75/23	Grazing	RALGRO	2.12	2.09	+1.42	Cameron, et al — 1977 —
6	74/25	Grazing	SYN-H	2.16	2.15	+0.46	Montana State University
7	30	Finishing	RALGRO	2.56	2.47	+3.52	Yamamoto, et al — 1978 — Colorado State University
8	101/117	Finishing	RALGRO	4.14	3.82	+7.73	Rupp, et al — 1980 —
9	37/44	Finishing	SYN-H	4.01	3.96	+1.25	Colorado State University
10	35/38	Finishing	SYN-S	4.25	4.01	+5.65	
11	39/38	Finishing	2 RALGRO	4.06	3.91	+3.69	
12	32/33	Grazing	RALGRO	1.98	1.89	+4.55	Rush and Reece — 1981 —
13	35	Grazing	SYN-H	1.98	1.85	+6.57	University of Nebraska
14	32/33	Finishing	RALGRO	2.39	2.26	+5.44	
15	35	Finishing	SYN-H	2.25	2.39	−5.86	
16	54/27	Grazing	RALGRO	1.71	1.62	+5.26	Shoop, et al — 1983 — USDA
17	54/27	Grazing	2 RALGRO	1.74	1.62	+6.90	Experiment Station
17	729/601					=+1.84	

(Range from −5.86 to +7.73) (77% of trials favored Spayed-Implanted Heifers)
* Two values indicate unequal group size, Spayed/Non-Spayed.

TABLE 3. Gain Data Summary Comparing "Spayed-Implanted" and "Non-Spayed Non-Implanted" Heifers.

Trial	Animals/Group*	Type Ration	Implant	Average Daily Gain (lbs.) Spayed Implanted	Average Daily Gain (lbs.) Non-Spayed Implanted	ADG Difference %	Source of Information — Year
1	23/24	Growing	DES	1.15	1.04	+9.6	Nygaard and Embry — 1966 —
2	24	Growing	SYN-H	1.14		+8.8	South Dakota State
3	20/24	Finishing	DES	2.35	2.15	+8.5	
4	23	Finishing	SYN-H	2.25	2.15	+4.5	
5	25/25	Growing	SYN-H	1.71	1.57	+8.2	Whetzal, et al — 1966 —
6	25	Growing	DES	1.64		+4.3	South Dakota State University
7	24/25	Finishing	SYN-H	2.17	2.02	+6.9	
8	25	Finishing	DES	2.10		+3.8	
9	75/26	Grazing	RALGRO	2.12	2.07	+2.4	Cameron, et al — 1977 —
10	74/26	Grazing	SYN-H	2.16		+4.2	Montana State University
11	30/29	Finishing	RALGRO	2.56	2.35	+8.3	Yamamoto, et al — 1978 — Colorado State University
12	101/119	Finishing	RALGRO	4.14	3.88	+6.3	Rupp, et al — 1980 — Colorado State University
13	46/47	Grazing	DES	1.75		+10.9	Rush and Reece — 1981 —
14	45	Grazing	RALGRO	1.79	1.56	+12.8	University of Nebraska
15	47	Grazing	SYN-H	1.71		+8.8	
16	32/36	Grazing	RALGRO	1.98	1.74	+12.1	
17	35	Grazing	SYN-H	1.98		+12.1	
18	54/27	Grazing	RALGRO	1.71	1.57	+8.2	Shoop, et al — 1983 USDA Experiment Station
18	728/407					= +7.82	

(Range from +2.4 to +12.8) (100% of trials favored Spayed-Implanted over Non-Spayed-Non-Implanted)
* Two values indicate unequal group size, Spayed/Non-Spayed.

Spaying Costs:

Survey	— $4.00
Death Loss	— $0.60
	$5.60

Brucellosis Costs:

Immunization	— $1.00
Labor	— $1.00
	$2.00

Pregnancy Costs: (aborting pregnant heifers only)

Examination	— $1.00
Labor	— $1.00
5% pregnant	— $1.50
10% pregnant	— $3.00
15% pregnant	— $4.50
	$2.00 to $6.50

Potential Gain Increase from Spaying and Implanting:
2% over 150 days, ADG @1.5 lb and $60/cwt price
(150) (1.5) (0.2) (.60) = $2.70

Estimated Economic Benefit From Spaying Up To The Feeder Phase

	Minimum	Expected
Benefit	$6.70	$11.30
Cost	$5.60	$ 5.60
Difference	$1.10	$ 5.70

Problems Associated with or Attributed to Spaying Heifers

Death loss, sickness and reduced performance in heifers following spaying has been a major drawback for many producers. Several considerations are related to successful surgery including the technique, experience of the surgeon and the status of the cattle. The commonly used approaches are safe and effective when done properly and under the right conditions. However, any technique can be risky if done in an unclean manner or by untrained personnel. In my opinion, the K-R technique, when performed by experienced veterinarians, minimizes stress, reduces death loss (less than 0.15%) and improves performance with implanting. In addition, the technique is fast and effective, the clients have been well satisfied and most continue market heifer spaying as a management aid in their operation.

Riding or bulling in spayed heifers is reduced, but not totally eliminated. There is no data to suggest that the same problem with "buller steers," as stated above, occurs in spayed heifers. Performance has not been measurably affected by the existence of riding in any reported trials. The use of implants appears to increase the incidence of riding but more importantly increases the performance of heifers in terms of gain and feed efficiency.

The occurrence of prolapses, udder development and raised tailheads has been attributed to spaying by some producers and/or buyers, but has not been documented to occur in any greater incidence in spayed heifers than intact heifers.

The fact that spaying is permanent has led some speculators away from the procedure. Many producers, on the other hand, feel this is an advantage in controlling the destination of their heifers to market.

Spaying has been associated with excessively fat heifers at slaughter and excessive trimming on the carcass. The fat deposition at lighter weights has been documented in several trials where spayed heifers have not been implanted. This

effect is aggravated by overfeeding heifers past their finishing weights. Recent information, however, demonstrates no differences between spayed or intact heifers when implants are used. The K-R vaginal spaying method has eliminated additional carcass trimming due to flank incisions.

Finally, a few instances of "spayed heifers" becoming pregnant have been reported. This may happen in rare instances if a small piece of ovary is left intact but is rare. The best way to avoid this problem is by utilizing good technique and permanent identification of all spayed heifers. Again, based upon producers who retain ownership through the feedlot and stand behind their heifers year after year at slaughter, the problem is unrelated to spaying.

Conclusion

After evaluating the research by many investigators the facts seem clear regarding the benefits that can be obtained by spaying heifers. When heifers are properly spayed at the correct age, weight and condition they recover rapidly. They have also demonstrated weight gain equal to or better than intact heifers of similar breeding when compared under identical management conditions without being affected by adverse problems such as those associated with pregnancy.

The fact that heifers are properly spayed does not improve their genetic makeup in terms of performance and does not guarantee the owner a premium price at sale time. The heifers will not be "docked" for pregnancy in a reputable livestock auction however, if adequate proof or owner reputation assures buyers of the seller's claim. It is interesting to note that an average pregnancy rate of 0% to 50% occurs in heifers sold as "open."[32] Similar problems have been reported in "spayed" heifers.[9] Marketing strategy is just as important for spayed heifers as any other cattle and possibly even more critical in certain cases due to some of the undocumented "mis-information." It is important to coordinate all areas of market heifer production for maximum success. Spaying is not a panacea for poor management or inadequate market prices but rather a valuable tool for improving production efficiency when correctly used.

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