Management of Spayed Heifers*

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The practice of spaying (ovariectomizing) heifers that are destined for market has been used by cattle producers in the United States for more than 100 years. The primary reason for spaying has been to prevent pregnancy during the two- or three-year growing phase of heifer development under range conditions. Another reason for spaying is related to the controlling infectious disease in cattle by preventing market heifers from becoming breeding stock when sold. Despite many changes in the beef cattle industry, these reasons remain valid today and provide a continuous source of spayed heifers that increases and decreases with the cattle cycle because of price differentials between market heifers and steers.

Steers are generally preferred to heifers for grazing and feeding purposes. Although price discrimination against market heifers is mainly related to performance, the potential for pregnancy is a significant factor.[1] Pregnant heifers are an obvious disadvantage to the feeder, and, in turn, the packer. The loss in dressing percentage caused by advanced pregnancy in heifers is frequently the first concern expressed by feeders. The possibility of pregnancy and calving during the feeding period incurs even greater decreases in value because of weight loss, reduced feed intake, and increased mortality associated with dystocia.[2-5]

The interest in spaying heifers has led to several trials (measuring gain, feed efficiency, carcass characteristics, and other performance parameters) designed to compare spayed heifers with their intact (nonspayed) counterparts. This column provides an overview of important findings that can be useful in making management decisions regarding growing and finishing spayed heifers.

Effect of Spaying on Gain

The effect of ovariectomy on gain has been well defined in many scientific trials. When genetics, management, nutrition, and age are similar, intact heifers gain more than nonimplanted spayed heifers. Table 1

Table 1. Gain data summary of 10 trials comparing nonimplanted spayed heifers and nonimplanted nonspayed heifers grazing or on growing rations.

No.	n[a]	Feed/Ration	Spayed ADG	Intact ADG	% Difference	Stats[b]	Year
1	10/10	Growing	1.45	1.74	-16.67	NA	1957-8[28]
2	10/11	Growing	1.41	1.69	-16.57	NA	1957-8[28]
3	10/10	Grazing	1.28	1.47	-12.93	NS	1960[8]
4	24/24	Growing	0.93	1.04	-10.58	NA	1966[9]
5	75/25	Grazing	1.94	2.07	- 6.28	$p \leq 0.05$	1977[30]
6	47/47	Grazing	1.55	1.56	- 0.64	NA	1981[31]
7	36/36	Grazing	1.74	1.75	- 0.57	NA	1981[31]
8	54/27	Grazing	1.47	1.57	- 6.37	NS	1983[32]
9	132/132	Grazing	1.11	1.3	-14.62	$p \leq 0.05$	1986[12]
10	18/18	Growing	1.96	2.2	-10.9	NS	1990[10]
Avg			1.48	1.64	- 9.61		

[a]number spayed/number intact
[b]NA - statistics not available; NS - not significantly different @ $p \leq 0.05$; $p \leq 0.05$ - significant.

summarizes gain differences in grazing and growing conditions. The average advantage in gain was nearly 10% for intact heifers; the range (0.57% to 16.67%) consistently favoring the nonspayed heifers. These trials demonstrate that spaying heifers reduced growth and increased fat deposition at lighter weights or earlier ages (an explanation for the lower gains). In most studies, the differences in performance between nonimplanted spayed and intact heifers continued through the finishing period (Table 2). Average differences in gain were not as great (6.05%) but the range increased from 4.84% to - 16.35%, again favoring intact heifers.

Studies of the use of growth-promoting feed additives and implants conducted during the last 40 years have demonstrated a reversal in the difference in gain response between intact and spayed heifers (Table 3). In nine trials that involved exogenous growth promotants, the weight gains of ovariectomized heifers averaged 3.06% greater than those of nonspayed controls, despite the fact that two of the trials favored the latter. A similar trend is evident in Table 4, which involves the same implants with feeder heifers on finishing rations, the average difference is 1.5%. It is reasonable to assume at least equal gains when spayed and intact groups are implanted.

Because potential breeding heifers may not be implanted, it may be valuable to compare the response of implanted a spayed heifers with that of nonimplanted intact heifers. The spayed implanted heifers consistently outperformed the nonimplanted intact heifers. The average response to implants resulted in approximately a 10% improvement in growing trials and 6% in finishing trials. Comparing Tables 1 and 2 with Tables 5 and 6 demonstrates a dramatic response to implanting in spayed heifers compared with that in nonspayed heifers.

Other Considerations

Slaughter weight loss is estimated to result in a 0.66% decrease in dressing percentage for each 10%

Table 2. Gain data summary of 23 trials comparing nonimplanted spayed heifers and nonimplanted nonspayed heifers on finishing rations.

No.	na	Feed/Ration	Spayed Non-Implant ADG	Non- Spayed Non-Implant ADG	% Difference	Stats	Year
1	5/5	Finishing	2.07	1.99	3.86	NA	1896[24]
2	5/5	Finishing	1.7	1.86	- 8.6	NA	1896[24]
3	14/14	Finishing	1.89	2.15	-12.09	NA	1930[26]
4	17/17	Finishing	1.66	1.92	-13.54	NA	1930[26]
5	12/12	Finishing	1.86	1.77	4.84	NA	1940[27]
6	12/12	Finishing	1.79	1.99	-10.05	NS	1940[27]
7	5/5	Finishing	1.54	1.72	-10.47	NS	1950[33]
8	5/5	Finishing	1.91	2.07	- 7.73	NS	1950[33]
9	7/7	Finishing	1.8	1.87	- 3.74	NA	1956[34]
10	6/6	Finishing	1.86	1.92	- 3.13	NA	1956[35]
11	10/10	Finishing	1.66	1.79	- 7.26	NA	1957-8[28]
12	11/11	Finishing	1.66	1.78	- 6.74	NA	1957-8[28]
13	10/10	Finishing	1.79	1.96	- 8.67	NS	1958[36]
14	10/10	Finishing	1.62	1.93	-16.06	p≤0.05	1960[8]
15	23/23	Finishing	1.82	2.15	-15.35	NA	1966[9]
16	16/16	Finishing	1.74	2.08	-16.35	p≤0.05	1969[37]
17	29/29	Finishing	2.44	2.35	3.69	NS	1978[6]
18	115/115	Finishing	3.76	3.88	3.09	NS	1987[15]
19	47/47	Finishing	2.06	2.04	0.98	NA	1981[31]
20	36/36	Finishing	2.39	2.28	4.6	NA	1981[31]
21	19/19	Finishing	2.24	2.31	- 3.03	NS	1985[23]
22	18/18	Finishing	2.2	2.53	-13.04	NS	1990[10]
23	14/14	Finishing	2.86	2.99	- 4.35	NS	1990[11]
AVG			2.01	2.14	- 6.05		

[a]number spayed/number intact

[b]NA - statistics not available; NS - not significantly different @ p≤0.05; p≤0.05 - significant.

Table 3. Gain data summary of 9 trials comparing implanted spayed heifers and implanted nonspayed heifers grazing or on growing rations.

No.	n[a]	Feed / Ration	Spayed ADG	Intact ADG	Implant	% Difference ADG	Stats[b]	Year
1	24/24	Growing	1.14	1.23	Syn-H	-7.32	NA	1966[9]
2	75/25	Grazing	2.12	2.09	Ralgro	1.44	NS	1977[30]
3	74/25	Grazing	2.16	2.15	Syn-H	0.47	NS	1977[30]
4	32/33	Grazing	1.98	1.89	Ralgro	4.55	NA	1981[31]
5	35/35	Grazing	1.98	1.85	Syn-H	6.57	NA	1981[31]
6	54/27	Grazing	1.71	1.62	Ralgro	5.26	NS	1983[32]
7	54/27	Grazing	1.74	1.62	Ral-2X	6.9	NS	1983[32]
8	398/73	Growing	1.47	1.48	Ralgro	-0.67	NS	1986[12]
9	18/17	Growing	2.77	2.51	Syn-H	10.36	NS	1990[10]
Avg			1.90	1.83		3.06		

[a]number spayed/number intact
[b]NA - statistics not available; NS - not significantly different @ p≤0.05; p≤0.05 - significant.

Table 4. Gain data summary of 10 trials comparing implanted spayed heifers and implanted nonspayed heifers on finishing rations.

No.	n[a]	Feed / Ration	Spayed ADG	Intact ADG	Implant	% Difference ADG	Stats[b]	Year
1	24/24	Finishing	2.25	2.3	Syn-H	-2.17	NA	1966[9]
2	30/30	Finishing	2.56	2.47	Ralgro	3.52	NS	1978[6]
3	101/117	Finishing	4.14	3.82	Ralgro	7.73	p≤0.05	1987[15]
4	37/44	Finishing	4.01	3.96	Syn-H	1.25	NS	1987[15]
5	35/38	Finishing	4.25	4.01	Syn-S	5.65	NS	1987[15]
6	39/38	Finishing	4.06	3.91	Ral-2X	3.69	NS	1987[15]
7	32/33	Finishing	2.39	2.26	Ralgro	5.44	NA	1981[31]
8	35/35	Finishing	2.25	2.39	Syn-H	- 5.86	NA	1981[31]
9	17/18	Finishing	2.66	2.66	Syn-H	0	NS	1990[10]
10	14/14	Finishing	3.15	3.3	Syn-H	- 4.55	NS	1990[11]
Avg			3.17	3.11		1.47		

[a]number spayed/number intact
[b]NA - statistics not available; NS - not significantly different @ p≤0.05; p≤0.05 - significant.

pregnancy rate.[2] Because of this loss, it is common to treat pregnant heifers with abortifacients, at least until the last trimester of pregnancy. This practice has produced a significant improvement in net return even though heifers that underwent abortion had reduced feed intake, gain, and feed efficiency.[2-5] Properly implanted spayed heifers can give the feeder an economic advantage because of the potential of pregnant feeder heifers in nonspayed groups.

Although carcass differences between spayed and intact heifers are usually minor and do not differ significantly different in most trials, overfeeding is believed to amplify the differences in protein and fat deposition. Certain differences that have been noted in rib eye area, marbling, internal fat, and external fat favor the nonspayed heifer carcasses. With proper implanting in spayed heifers, these differences were not observed.[6-11]

The problems related to spaying are common to many surgical procedures and include hemorrhage, infection, adhesions, reduced performance, and initial cost. Since the development of vaginal spaying, studies have been specifically designed to assess differences in the spaying methods used.[12-14] The studies suggest that the method is less important than the expertise of the op-

Table 5. Gain data summary of 11 trials comparing implanted spayed heifers and nonimplanted nonspayed heifers grazing or on growing rations.

No.	n[a]	Feed / Ration	Spayed ADG	Intact ADG	Implant	% Difference ADG	Stats[b]	Year
1	24/24	Growing	1.14	1.04	Syn-H	8.8	NA	1966[9]
2	25/25	Growing	1.71	1.57	Syn-H	8.2	NA	1966[38]
3	75/26	Grazing	2.12	2.07	Ralgro	2.4	NS	1977[30]
4	74/26	Grazing	2.16	2.07	Syn-H	4.2	NS	1977[30]
5	45/45	Grazing	1.79	1.56	Ralgro	12.8	NA	1981[31]
6	47/47	Grazing	1.71	1.56	Syn-H	8.8	NA	1981[31]
7	32/36	Grazing	1.98	1.74	Ralgro	12.1	NA	1981[31]
8	35/35	Grazing	1.98	1.74	Syn-H	12.1	NA	1981[31]
9	54/27	Grazing	1.71	1.57	Ralgro	8.2	$p \leq 0.05$	1983[32]
10	398/73	Grazing	1.46	1.3	Ralgro	12.3	NA	1986[12]
11	17/18	Growing	2.77	2.2	Syn-H	25.91	$p \leq 0.05$	1990[10]
Avg			1.87	1.67		10.53		

[a]number spayed/number intact
[b]NA - statistics not available; NS - not significantly different @ $p \leq 0.05$; $p \leq 0.05$ - significant.

erator. Beyond the immediate surgical concerns, flank spaying poses the greatest potential problem because of scarring at the surgical site and possible carcass damage caused by pulling the hide during processing. The speed, ease, and reduced stress on animals generally favor vaginal spaying; postsurgical problems are minimal if the operator is experienced.[10,15,16]

Problems related to pregnant heifers being represented and sold as spayed are best eliminated by dealing with reputable sellers, being familiar with the origin of the cattle, or knowing the veterinarian who performs the surgery. Leaving a small piece of ovary or missing an ovary can lead to pregnancy after spaying.[6] This problem is rare and should not occur if practitioners and technicians are experienced. If heifers are spayed in the latter third of gestation, they may carry the pregnancy to term.[17] Some lots of heifers may be misrepresented; official, signed health and spaying certificates should ensure proper removal of the ovaries. During the past few years, many owners of spayed heifers have maximized the benefits of spaying stocker heifers by retaining ownership through the finishing phase.

Initially, attempts to autotransplant a small amount of ovarian tissue under the serosa of the rumen wall during flank spaying received considerable attention; however, this procedure is rarely used because trials failed to demonstrate increased performance.[12-14,18-22] Data from most of these trials indicate the importance of proper implanting regardless of ovarian autografting.

Problems that result directly from riding have not been documented in spayed heifers. Mounting is often observed for a short period after spaying and implanting and is increased by the use of implants.[10,14] Although implanting increases the occurrence of riding, the problem is usually inconsequential. The benefits of the use of implants has been proven to outweigh the possible problems related to riding. A problem similar to that of buller steers has not been documented in pens of spayed heifers.

The use of melengestral acetate in spayed heifers has not proven to be beneficial.[11,23] As a growth promotant, melengestral acetate acts primarily by producing endogenous estrogen from persistent follicles and thus would not be expected to be valuable in ovariectomized heifers.

The use of trenbolone acetate, alone or in combination with estradiol benzoate, is also of interest in spayed heifers. A related column by Dr. Louis J. Perino (Compen, August 1995:S37) provides comparisons of implants with these compounds in spayed and intact heifers. Trenbolone acetate is apparently not useful in improving performance in spayed heifers.

Conclusion

The results of studies dating back nearly one century related to the performance of spayed heifers in pen-fed conditions are still relevant in heifer management today.[24-27] According to these studies, two-year-old steers and spayed heifers were carrying too much fat; spaying was of most importance to ranchers and had little benefit for feeders who fattened the cattle. The early investigators found that spaying reduced gain and feed efficiency and generally hastened fattening.

The use of growth promotants in spayed heifers reverses the effect on gain and restores performance to

at least that of implanted nonspayed heifers. Although results indicate equal performance in spayed implanted heifers and intact heifers, if the number of pregnant heifers increases in nonspayed groups, performance (measured on a carcass basis) declines because of the loss in dressing percentage.

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