



BEEF CATTLE RESEARCH UPDATE

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Effect of Vaccination Program on Antibody Response, Health, and Performance of Receiving Cattle

Stress compromises the ability of calves to illicit an immune response to vaccines due the deleterious effect of stress on antibody development. In addition, maternally derived antibodies have been shown to reduce the immune response to vaccines and this reduction might be less pronounced with intranasal vaccination. Thus, New Mexico State University research evaluated the effects of an alternative intranasal-based vaccination program compared with a traditional subcutaneous injection-based vaccination program on calf health, performance and antibody response.¹ In this 56 day study, beef heifers (409 lb initial weight) were randomly assigned to three treatments: 1) no vaccination, 2) intranasal vaccination, and 3) injection-based vaccination. At initial processing (day 0), intranasal calves received an intranasal bacterial (*M. hemolytica* and *P. multocida*: Once PMH[®] IN, Merck Animal Health,) and modified live virus vaccine (IBR and PI3: Nasalgen[®] IP, Merck Animal Health). Injected calves received a modified live virus (IBR, BVD type 1 and 2, PI3, BRSV, *M. hemolytica* and *P. multocida*: Vista[®] Once SQ, Merck Animal Health) and a clostridial vaccine (Vision[®] 7, Merck Animal Health) at initial processing. On day 14, both groups of vaccinated calves received the same injectable vaccines used on the injected calves at initial processing.

These researchers reported that during the 56 day experiment the performance (dry matter intake, average daily gain and feed to gain ratio) did not differ among the vaccination programs. In addition, morbidity, and mortality were not different. They concluded that the route of vaccine administration and number of antigens in vaccines did not affect health, performance, and immune response of newly received feedlot heifers.

Carcass Gain, Efficiency, and Profitability in Steers at Extended Days on Feed

Over the last few years, the feedlot industry has been marketing greater numbers of finished cattle on a carcass weight basis or individual carcass grid value basis as compared to the traditional live weight basis. This has had a major impact on the industry. The economic signals of carcass weight marketing are dramatically different than for selling live weight, especially at the end of the feeding period. Research has shown that carcass weight gain is typically 75 to 85% of live weight gain at the end of the feeding period.² While live weight gain slows, rate of carcass gain remains steady, creating the increase in dressing percentage that occurs as cattle progress through a normal feeding period. As a result of these changes, fed cattle are being fed for longer periods of time (increased average days on feed, DOF). Cattle which are fed longer have increased risk for discounts for overweight carcasses and increased yield grade while also having an increased chance for receiving premiums for higher quality grades.

University of Nebraska researchers used crossbred steers (767 lb initial weight) in an experiment to evaluate the change in carcass composition throughout the feeding period and the economic profit or loss realized by feeding cattle 0, 22 and 44 days longer than the industry average.³ In this study, steers were fed (twice daily) a common finishing ration through the GrowSafe feeding system, recording daily individual feed intake. Real time carcass ultrasound measurements were collected on days 1, 78, and 134 of the feeding period. The steers were considered to have reached the industry average when the group appeared to be at 0.5 inches of back fat thickness. The first set of calves was harvested at 142 DOF, while the second and third groups were harvested at 163 and 185 DOF, respectively. An economic analysis was applied to the data to determine the profit or loss per head when feeding to longer DOF. In this analysis, a base Choice carcass price of \$2.53/cwt

was used. Some of the major premiums and discounts (\$/cwt) used in the analysis were: hot carcass weight ≥ 1050 lb (-\$23.47), Prime Quality Grade (+\$15.88), Select Quality Grade (-\$6.08), Yield Grade 4 to 4.99 (-\$8.27) and Yield Grade ≥ 5 (-\$13.42).

The effects of days on feed on feedlot performance, carcass characteristics, and profitability are shown in Table 1. Both live average daily gain (ADG) and gain efficiency (gain to feed ratio) decreased linearly ($P < 0.04$) as steers were fed longer while dry matter intake (DMI) did not differ among DOF treatments. Hot carcass weight (HCW) increased linearly ($P < 0.01$) from 823 to 903 lb, as steers were fed to 142 and 185 DOF, respectively. Rib-eye area quadratically increased ($P = 0.04$) from 13.8 to 14.5 square inches (142 and 163 DOF, respectively) and was 14.3 square inches at 185 DOF. Marbling score numerically increased with extended days on feed (475 vs. 506 for 142 and 185 DOF, respectively). Calculated yield grade and fat thickness increased linearly ($P < 0.01$) as DOF increased. The cattle fed 142 or 163 days produced no overweight carcasses (≥ 1050 lb), whereas, 2.63% of the 185 DOF steers had overweight carcasses. The percentage of carcasses with yield grades 4 or 5 increased from 5.26 to 13.16 and 31.58% with for 142, 163, and 185 DOF, respectively.

Table 1. Effects of days on feed on feedlot performance, carcass characteristics, and economics.

Item	Days on Feed			Contrasts	
	142	163	185	Linear	Quadratic
Feedlot Performance:					
Initial weight, lb	760	772	769	0.63	0.64
Final weight, lb	1306	1356	1433	< 0.01	0.56
DMI	23.8	23.5	24.1	0.59	0.31
ADG	3.79	3.58	3.59	0.04	0.20
Gain:Feed	0.159	0.153	0.149	0.01	0.62
Carcass Characteristics:					
HCW, lb	823	854	903	< 0.01	0.56
Rib-eye area, sq. in,	13.8	14.5	14.3	0.06	0.04
Marbling	475	476	506	0.14	0.42
Fat thickness, in.	0.49	0.58	0.69	< 0.01	0.79
Yield Grade	2.89	3.05	3.56	< 0.01	0.20
% with HCW ≥ 1050 lb	0.00	0.00	2.63		
% Choice or better	84.21	76.32	86.84		
% Yield Grade 4 or 5	5.26	13.16	31.58		
Economics:					
Total costs, \$/hd	432.09	483.21	551.14		
Total profit, \$/hd	2.77	16.69	54.14		

The economic analysis showed that steers fed for 163 and 185 days had higher total feedlot costs than 142 DOF (\$483.21 and \$551.14 vs. \$432.09, respectively). However, profit per head was greater for steers fed for 163 and 185 DOF (\$16.96 and \$54.11 vs. \$2.77, respectively). This was due to increased HCW and quality grade premiums. These researchers concluded that with current market conditions, cattle can be fed for 44 days longer and increase revenue per head even though HCW and yield grade discounts increase.

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- ¹ Oosthuysen, E. R., M. E. Hubbert, J. R. Graves, A. K. Ashley, and C. A. Loest. 2015. Effects of vaccination program on antibody response, health, and performance of receiving calves. In: 2015 Plains Nutrition Council Spring Conference, San Antonio, TX. p. 120-121 (Abstr.).
- ² Streeter, M. N., J. P. Hutcheson, W. T. Nichols, D. A. Yates, J. M. Hodgen, K. J. Vander Pol, and B. P. Holland. 2012. Review of Large Pen Serial Slaughter Trials - Growth, Carcass Characteristics, Feeding Economics. In: Plains Nutrition Council Spring Conference, San Antonio, TX. p. 58-72.
- ³ Bondurant, R. G., J. C. MacDonald, G. E. Erickson, K. Brooks, R. N. Funston, and K. Bruns. 2015. Carcass gain, efficiency, deposition changes, and profitability in steers at extended days on feed 2015 Plains Nutrition Council Spring Conference. p 106-107 (Abstr.). Texas Agrilife Research and Extension Center, Amarillo, TX, San Antonio, TX.