Agricultural Experiment Station U. S. Department of Agriculture

Department of Animal and Range Sciences

CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Progress Report No. 73 (December, 1991)

Oral α-Interferon for Newly Received Calves[1]

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Interferon is produced by the cells of vertebrate animals when they are infected by a virus. Preliminary experiments suggest that α-interferon may stimulate the antibody response to vaccines given to beef cattle that are susceptible to bovine respiratory disease (BRD). We conducted a cooperative experiment with Amarillo Cell Culture, Inc., Amarillo, TX, to determine the effects of oral α-interferon on performance and antibody response of newly received beef cattle. Only performance data will be summarized in this report.

Two hundred mixed breed (British x British and British x Brahman) calves were shipped by semi-tractor trailer from Gerrell, TX to the Clayton Livestock Research Center (CLRC) in Clayton, NM. Calves were in transit for approximately 12 h and experienced a 5.5% shrink from a pay weight of 505 lb. Half the calves received no treatment (control) and half received 3 mL of α-interferon (100 IU/mL) orally on the day of, and day after, arrival at the CLRC. Assignment to control and interferon treatment was done randomly for the first calf processed, after which calves were assigned alternately to either control or interferon treatments.

On the day of arrival, each calf was weighed, and its rectal temperature was taken. Calves with a temperature of > 106°F were treated with Naxcel (Upjohn, Kalamazoo, MI - ceftiofur sodium; intramuscular) and penicillin (Pfi-Pen G, Pfizer Agric. Div., New York, NY; intramuscular). Each calf was checked to determine sex class (steer or bull), and bull calves were castrated. Calves assigned to receive interferon were given 3 mL of α-interferon orally. Following this initial day processing, all calves were placed in two large holding pens with ad libitum access to large, round bales of sorghum sudangrass hay.

On the day after arrival, each calf was weighed and its rectal temperature checked. In addition, calves were branded, injected with Synanthic wormer (Syntex Anim. Health, Inc., Des Moines, IA), treated down the backline with Tiguvon (Cutter Anim. Health, Mobay Corp., Anim. Health Div., Shawnee, KS), vaccinated (intramuscular) with Bovishield 4 (Norden Labs, Inc., Lincoln, NE), vaccinated (subcutaneous) with Ultrabac 7 (Beecham Labs, Bristol, TN) and injected (intramuscular) with Rocavit A and D_3 solution (Hoffmann-LaRoche, Inc., Nutley, NJ). Each calf also was bled by jugular venipuncture, and interferon calves received a second oral dose of 300 IU of α-interferon. After processing, calves were assigned randomly to one of 20 pens and fed a 65% concentrate diet (see Progress Report No. 70 for diet). Small bales of sorghum sudangrass hay were available in each pen during the first week of the experiment.

Calves were weighed again on days 7, 14, 28 and 56 of the experiment. Rectal temperature of each calf was determined on day 7. On days 14, 28 and 56, feed remaining in the feed bunks was weighed and assayed for dry matter content. Beginning the day after calves were placed in their assigned pens, they were evaluated visually for signs of BRD (nasal/ocular discharge, depression, anorexia). Calves were treated if they had a rectal temperature indicative of respiratory disease along with visual signs. Calves with a rectal temperature of > 106°F were treated regardless of visual signs. Half the morbid calves in each treatment group received a 3-mL oral dose of α-interferon on the first day of medical treatment along with Naxcel and penicillin; each calf then received two additional days of treatment with Naxcel. Calves pulled for a second time received α-interferon if they had received it on the first pull, and were further treated (intramuscular) with erythromycin 200 (RXV Veterinary Products, Porterville, CA) plus (intramuscular) Tylan 200 (Elanco Products, Co., Indianapolis, IN) Treatment with erythromycin and Tylan was continued for a second day, regardless of response. If the calf responded to treatment, no treatment was administered on the third day. Calves pulled for a third time were treated with the same drugs given on the second pull, or with (intramuscular) LA 200 (Pfizer Agric. Div., New York, NY). Three calves died from pneumonia during the course of the experiment.

Pen data for daily gain (initial weight was the average of arrival and processing weights), feed intake and feed efficiency for the experiment were analyzed with a statistical model that included the effect of arrival treatment (control vs interferon). Individual morbidity records (number of times pulled for treatment and days treated) were analyzed by non-parametric statistical procedures. The model included effects for arrival treatment, morbidity treatment and the arrival treatment by morbidity treatment interaction.

Daily gain, for any period of the experiment, was not affected ($P > .10$) by oral administration of interferon at arrival and processing (Table 1). Likewise, daily intake of dry matter was not altered by arrival/processing treatment with interferon (Table 1). Feed efficiency was numerically greater for interferon-treated calves from days 0 to 28, but less ($P < .08$) for interferon-treated calves from days 28 to 56 of the experiment. For the entire 56 days, interferon-treated calves tended ($P < .17$) to have a better feed-to-gain ratio than control calves did. These data suggest no adverse effects of oral interferon (300 IU), administered at arrival and processing (day after arrival), on daily gain and feed intake by newly received beef steers. However, numerical increases in daily gain and decreases in feed intake, especially from days 28 to 56 of the experiment, combined to produce an improved feed-to-gain ratio in interferon-treated calves.

[1]We appreciate the financial assistance and labor provided by Amarillo Cell Culture, Inc., Amarillo, TX.

Analysis of morbidity data indicated that arrival/processing treatment with interferon did not interact with use of interferon in morbid calves. Hence, main effects of arrival/processing treatment are shown in Table 2. No differences ($P > .69$) were noted between arrival/processing treatments for percentage of calves treated for BRD.

Among morbid calves, 36 received interferon on the first day of medical treatment, and 36 were non-treated controls. Thirty-two of the control calves required only one pull, and 27 of the interferon-treated calves required only one pull (Table 3). Hence, four control calves and nine calves given interferon at the time they were pulled received two or more pulls for medical treatment (repulls). These data suggest that administration of 3 mL (300 IU) of α-interferon orally on the first day that a calf was pulled for medical treatment tended ($P < .126$) to have a negative effect on subsequent morbidity (repulls). Reasons for this trend for a negative effect of interferon on repulls are unclear and deserve further study.

Table 1. Daily gain, daily feed intake and feed efficiency of newly received beef steers as affected by treatment with or without oral interferon for two days after arrival at the Clayton Livestock Research Center

Item	Treatment		SE
	Control	Interferon	
Daily gain, lb			
Days 0-14	-.06	.08	.14
Days 14-28	2.23	1.83	.22
Days 0-28	1.20	1.11	.12
Days 28-56	2.93	3.14	.10
Days 0-56	2.07	2.13	.07
Dry matter intake, lb/steer			
Days 0-14			
Hay[a]	1.26	1.27	.06
Concentrate	3.99	4.00	.19
Days 14-28	10.04	9.55	.25
Days 0-28	7.65	7.41	.20
Days 28-56	14.96	14.57	.23
Days 0-56	11.30	10.99	.18
Feed-to-gain			
Days 0-28	6.79	7.33	.72
Days 28-56	5.17[b]	4.67[c]	.19
Days 0-56	5.54	5.19	.17

[a]Fresh hay was offered during the first week only.

[b,c]Row means that do not have common superscript differ ($P < .08$).

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Table 2. Morbidity and mortality of newly received steers as affected by treatment with or without oral interferon for two days after arrival at the Clayton Livestock Research Center[a]

Item	Treatment	
	Control	Interferon
No. of calves	100	100
No. of dead calves	1	2
Calves treated for BRD, %[b]	35	37
Repulls, %[c]	5	8
No. of days treated/calf treated	3.29	3.62

[a]Dead steers included in calculations for morbidity.

[b]BRD = bovine respiratory disease.

[c]Calves treated two or more times for BRD.

Table 3. Effects of oral interferon on the first day of medical treatment on response of morbid, newly received steers at the Clayton Livestock Research Center

Item	Treatment when pulled[a]	
	Control	Interferon
No. of morbid calves	36	36
No. of calves treated once	32 (88.9)	27 (75.0)
No. of calves repulled[b]	4[c] (11.1)	9[d] (25.0)
No. of days treated/calf treated	3.42	3.50

[a]Calves treated with interferon received 3 mL orally on the first day of medical treatment. If a calf was repulled, it was assigned to the same treatment administered on the first pull. Values in parenthesis are %.

[b]Calves treated two or more times.

[c,d]Row means that do not have common superscripts differ ($P < .126$; Chi-square test).

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