THE EFFECT OF MASS MEDICATION ON HEALTH AND PERFORMANCE OF NEWLY ARRIVED STOCKER CATTLE

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Story in Brief

A total of 1437 newly received steer and bull calves and yearlings were used in studies to determine the effectiveness of certain mass medication procedures for reducing morbidity due to shipping fever. In one experiment, 1046 head averaging 473 pounds were divided into two groups: one received routine processing on arrival and the other received routine processing plus long-acting oxytetracycline and sustained release sulfadimethoxine. Morbidity was reduced from 33.2% in the non-mass medicated cattle to 14.6% in those receiving mass medication at processing. Mass medication reduced sick days per head from 2.25 to .81, and improved average daily gains and gain to feed ratios by 7.6% (1.56 vs 1.45 lb/head) and 11.2% (.119 vs .107 lb gain/lb feed), respectively.

In the second experiment, 391 head averaging 462 pounds were divided into four groups: 1) Control (routine processing only), 2) Long-acting oxytetracycline, 3) Sustained release sulfadimethoxine, and 4) Long-acting oxytetracycline plus Sustained release sulfadimethoxine. Mass medication with long-acting oxytetracycline, sustained release sulfadimethoxine, and a combination of the two drugs reduced morbidity by 22.1, 10.1, and 11.0%, respectively. Sick days per head was reduced by long-acting oxytetracycline (2.56 days) and long-acting oxytetracycline plus sustained release sulfadimethoxine (3.35 days) as compared to the controls (4.34 days). Mass medication had no effect on average daily gains but reduced feed intake.

(Key Words: Newly Received Cattle, Shipping Fever, Mass Medication)

Introduction

Between two and five percent of newly arrived stocker cattle received in Oklahoma die of stress related diseases, primarily the shipping fever-bovine respiratory disease complex (BRD), shortly after shipping. Morbidity ranges from 0 to 100 percent, with an average probably between 25 and 30 percent. Cattlemen receiving stressed cattle must be prepared with a complete health program to prevent excessive death loss and decreased performance. Because treating BRD is costly, it may be cheaper to prevent its occurrence rather than treat it (NCA, 1979). The administration of intramuscular oxytetracycline for the first three days after arrival of stressed calves in the feedlot has been shown to reduce the incidence of BRD, but this treatment is not always cost effective (Addis et al., 1976; Lofgreen, 1983). A disadvantage to this type of program is that all calves must be run through the chute for three successive days, increasing labor costs. Recently developed long-acting oxytetracycline (LAO) and sustained release sulfas (SRS) eliminate the need of running calves through the chute for three successive days.

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Lofgreen (1983) reported that the administration of both of these drugs to stressed calves at time of arrival reduced morbidity by 90%. The administration of LAO alone has also been shown to reduce morbidity due to BRD in stressed calves (Swafford et al., 1983).

The objective of this study was to evaluate the effect of mass medication with LAO and/or SRS on the health and performance of newly arrived, stressed stocker cattle.

Materials and Methods

Experiment One

Eleven truck loads of cattle in six different months (designated as trials) were assembled by order buyers with the majority coming from auction barns in the southeastern United States and shipped to Pawhuska, Oklahoma. The origin, arrival date and weight, number of head, and in-transit shrink for each load is summarized in Table 1. Newly received cattle were weighed individually off the truck, ear tagged, and poured with famphur systemic insecticide. Following weighing and tagging, cattle were placed in one of nine pens of 20 to 25 animals each, depending on the number of cattle received. Pens were randomly assigned to mass medication (MM) or non-mass medication (NMM) groups. Water and

Table 1. Origin, arrival date, number of head, arrival weight, and in-transit shrink for each load of cattle--Mass medication experiment one.

	Origin	Arrival Date	Number of Head	Arrival Wt., lb	% Shrink
Trial 1					
Truck 1	FL	9-15-83	101	429	11.3
Trial 2					
Truck 2	OK	10-20-83	95	440	8.5
Truck 3	FL	10-20-83	91	484	10.0
Trial 3					
Truck 4	OK	12-01-83	104	440	NA[a]
Truck 5	OK	12-08-83	88	440	NA[a]
Trial 4					
Truck 6	TN	1-10-84	93	491	7.0
Truck 7	TN				
1-12-84			99	482	7.0
Trial 5					
Truck 8	AK	2-18-84	79	532	6.5
Truck 9	AK	2-24-84	90	539	6.0
Trial 6					
Truck 10	MO	3-21-84	101	473	8.0
Truck 11	MO	3-28-84	105	486	NA[a]

[a]NA=not available.

native bluestem grass hay were provided free choice. On the morning following arrival, cattle were processed by pen as follows:

1. Body temperature and time were recorded.
2. Cattle were vaccinated with IBR-PI_3 (MLV) IM, Leptospira pomona bacterin, and Clostridia chauvoei, septicum, novyi, and sordellii bacterin.
3. Dewormed with levamisole gel.
4. Cattle in the MM group received an injection of LAO[a] (10 mg/lb) and SRS[b] boluses (1 bolus-12.5 g/200 lb of body weight).
5. Cattle in the NMM group received antibiotic treatment if clinical signs of illness were detected or if body temperature exceeded 104°F.
6. Hospital card was initiated (NMM).
7. Animals from the NMM group which were not sick and all MM cattle (sick or well) were returned to their home pen. Sick animals from the NMM group were placed in the hospital pen.

As soon as cattle were placed in their pens, they had ad libitum access to prairie hay and were offered a pelleted feed supplement (Table 2) at a rate of 2 lb/head/day for the first 21 days and 1 lb/head/day during days 22-28. The supplements contained 1) no added drugs, 2) lasalocid[c] (75 mg/lb), or 3) decoquinate[d] (50 mg/lb). Three hospital pens were maintained so that sick animals received their assigned feed while out of their home pen.

Mass-medication was assigned at random to either four or five pens in each trial with non-mass medicated cattle being placed in the remainder of the nine pens. In each trial, each feed medication was fed to at least one pen. Numbers of pens assigned to treatment were balanced between trials.

Table 2. Composition of feed supplement.

Ingredient	IFN[a]	% As Fed
Soybean Meal	5-20-637	88.9
Salt	6-04-152	3.0
Vitamin A - 30,000 IU/Gram		.22
Premix[b]		.18
Cottonseed Meal	5-01-621	5.0
Dicalcium Phosphate	6-01-080	2.75

[a]International Feed Number.
[b]To provide: 0 for control, 75 mg lasalocid/lb, or 50 mg decoquinate/lb.

[a]LA-200®, Pfizer, Inc., New York, NY 10017.
[b]Albon-SR®, Hoffman-LaRoche, Inc., Nutley, NJ 07110.
[c]Bovatec®, Hoffman-LaRoche, Inc., Nutley, NJ 07110.
[d]Deccox®, Rhone-Poulenc, Inc., Monmouth Junction, NJ 08852.

After processing, cattle were checked twice daily for signs of illness. If an animal was suspected to be sick, it was taken to the processing area where its body temperature was measured and a severity of illness score (slight, moderate, or severe) was assigned. If the body temperature exceeded 104°F the animal was considered sick. The animal could also be classified as sick based on clinical signs. Cattle receiving mass medication were not removed from their pen if they were detected as sick within the first 24 hours after processing.

Medical treatment for sick animals was determined by the ear tag number which was applied at random on arrival. Treatment schedules assigned to non-mass medicated cattle were: A) no treatment (negative controls), B) a sequence of antimicrobial drugs (Table 3), or C) an experimental potentiated sulfa (R05-0037[e]). Cattle treated by schedule B were initially treated with the first drug in the sequence. If body temperature dropped 2°F or to less than 104°F, or clinical signs were improved within 24 hours, the first drug was continued for two more days. If no improvement was apparent within 24 hours, the next drug in the sequence was used and the process was repeated until improvement was detected. In trials 3, 4, and 5, drug treatments 1 and 3 were reversed so that the first treatment was amoxicillin. Cattle treated by schedule C received R05-0037 boluses orally at 30 mg/lb on day one and 15 mg/lb on days 2-5, regardless of response to therapy. If additional treatment was required at the end of the 5 day treatment, cattle were started on the second drug in the sequence (Table 3). Any mass medicated cattle detected as sick were treated initially with the second drug in the antibiotic sequence.

At the end of the 28 day trial, the cattle were held overnight without feed or water, weighed the following morning and, as necessary, cattle were castrated and horns were tipped. Cattle were then returned to the owner.

Table 3. Sequence of drugs used for treatment of BRD.

Treatment No 1:	OXYTETRACYCLINE (Biomycin-C®) subcutaneously - 5 mg/lb. PLUS SULFAMETHAZINE BOLUSES (Sulmet® - 15 gm) 1 bolus/150 lb on day 1. One bolus/300 lb on subsequent days.
Treatment No 2:[a]	ERYTHROMYCIN (Gallamycin®) deep in the muscles - 10 mg/lb.
Treatment No 3:[a]	AMOXICILLIN (Amoxi-ject®) subcutaneously 5 mg/lb.
Treatment No 4:[a]	Procaine Penicillin G subcutaneously - 30,000 IU/lb.
Treatment No 5:[a]	TYLAN 200 - 10 mg/lb.
Treatment No 6:[a]	SPECTINOMYCIN (Spectam®) - 5 mg/lb.

[a]Some of the antimicrobial drugs used in this study were used for extra-label purpose or at extra-label dosages and require a veterinarian-client-patient relationship before use.

[e]Primor®, Hoffman-LaRoche, Inc., Nutley, NJ 07110.

Experiment Two

Four truck loads (four trials) of cattle were assembled by order buyers from auction barns in Alabama, Tennessee, or Texas and shipped to Pawhuska, Oklahoma. The origin, arrival date and weight, number of head, and in-transit shrink for each load is summarized in Table 4. Newly received cattle were weighed individually off the truck and treated with Lysoff®[f]. Following weighing and tagging, cattle were placed in pens of 20 to 25 animals each depending on the number of cattle received. Cattle were randomly assigned by pen to one of the following treatments: control, receiving no preventative medication; intramuscular injection of LAO at a rate of 10 mg/lb; oral administration of SRS at a rate of 12.5 g (one bolus)/200 lb; or administration of both drugs. Water and native bluestem grass hay were available free choice. The morning following arrival, the cattle were processed in the same manner as those in experiment one with the following exceptions: 1) Cattle with odd-numbered ear tags were dewormed with ivermectin[g] (200 µg/kg) and those with even-numbered ear tags served as controls as part of a deworming trial superimposed on this study and 2) Cattle receiving preventative medication were treated with their respective drugs.

As soon as cattle were placed in their pens, they had ad libitum access to prairie hay and were offered a pelleted feed supplement (Table 2 - with lasalocid) at a rate of 2 lb/head/day for the first 21 days and 1 lb/head/day during days 22-28.

After processing, cattle were checked twice daily for signs of illness as described in experiment one. Calves receiving preventative medication were not pulled if they were detected as sick within the first 48 hours of the trial. Sick cattle were assigned to medication schedule B (Table 3) beginning with treatment 2. In this experiment, spectinomycin replaced amoxicillin as treatment 3. Response to drug treatment was measured in the same manner as it was in experiment one.

At the end of the 28 day trial, the cattle were held overnight without feed or water, weighed the following morning and, as necessary, cattle were castrated and horns were tipped. Cattle were then returned to the owner.

Table 4. Origin, arrival date, number of head, arrival weight, and in-transit shrink for each load of cattle--Mass Medication Experiment Two.

Trial	Origin	Arrival Date	Number of Head	Arrival Wt., lb	% Shrink
1	TN	8-12-84	100	396	NA[a]
2	AL	9-28-84	100	455	7.6
3	AL	11-03-84	95	486	NA[a]
4	TX	12-06-84	96	506	4.3

[a]NA=not available.

[f]Cutter Laboratories, Shawnee Mission, KS 66201.
[g]Ivomec®, MSD Agvet, Rahway, NJ 07065.

Results and Discussion

Experiment One

Effects of mass medication with LAO and SRS on daily gains, sick days, morbidity, and mortality are shown in Table 5. Gains in the 28 day receiving period were significantly (P<.05) increased by mass medication (1.56 vs 1.45 lb/head/day). Gains of those cattle that were never sick were 1.63 and 1.69 lb/head/day for the NMM and MM groups, respectively. The number of sick days per head was reduced (P<.0001) by 64% (.81 vs 2.25 days/head) and morbidity was reduced (P<.0001) by 56% (14.6 vs 33.2%) with the administration of mass medication. These reductions in morbidity and hospital pen days and improvements in gains are consistent with results reported by Lofgreen (1983). Death loss in this experiment was .76% in both control cattle and mass medicated cattle. Another factor influencing (P<.0001) weight gains, sick days, and morbidity was truck load. Apparently, the response of cattle to mass medication was dependent on such factors as the origin of the cattle and degree of previous stress.

Effects of mass medication on feed intake and gain to feed ratio are reported in Table 6. Mass medication reduced (P<.01) feed intakes from 14.67 to 13.73 pounds per head per day. This 6.4% reduction in feed intakes combined with the 7.6% increase in daily gains with mass medication resulted in an improvement in gain to feed ratio of 11.2% (P<.05, .119 vs .107 lb gain/lb feed).

Table 5. Effect of mass medication on daily gains, sick days, morbidity and mortality in stressed cattle--Experiment One.

	Controls	Mass Medication
Number of head	523	523
Number of head never sick	352	442
Arrival weight*, lb	475	473
Daily gain, lb*	1.45[a]	1.56[b]
Daily gain of head never sick, lb*	1.63[d]	1.69[c]
Sick days*	2.25[d]	0.81[c]
Morbidity, %*	33.2[d]	14.6[c]
Total Mortality, %	0.76	0.76
Mortality excluding treatment schedule A cattle, %	0.38	0.76

*Expressed as least square means.
[a,b]Means with different superscripts differ (P<.05).
[c,d]Means with different superscripts differ (P<.0001).

Experiment Two

Effects of mass medication with LAO, SRS, or a combination of the two drugs on daily gains, sick days, morbidity, and mortality in cattle in experiment two are reported in Table 7. None of the mass medication procedures altered (P>.05) average daily gains of the cattle. However,

Table 6. Effect of mass medication on feed intake and gain to feed ratio--Experiment One.

	Controls	Mass Medication
Number of pens	26	25
Feed intake, lb*	14.67[b]	13.73[a]
lb gain/lb feed*	0.107[c]	0.119[d]

*Expressed as least square means.
[a,b]Means with different superscripts differ (P<.01).
[c,d]Means with different superscripts differ (P<.05).

Table 7. Effect of mass medication on daily gains, sick days, morbidity and mortality in stressed cattle--Experiment Two.

	Controls	LAO	SRS	LAO + SRS
Number of head	98	98	98	97
Number of head never sick	39	52	45	45
Arrival weight, lb*	460	462	462	460
Daily gain, lb	1.41	1.36	1.14	1.36
Daily gain of head never sick, lb*	1.65[b]	1.69[a]	1.58[b]	1.80
Sick days*	4.34[b]	2.56[a]	4.24[b]	3.35[ab]
Morbidity, %*	60.2	46.9	54.1	53.6
Mortality, %	3.1	1.0	6.1	2.1

*Expressed as LSMEANS.
[a,b]Means with different superscripts differ (P<.05).

the cattle treated with SRS tended to have lower gains than all other cattle. Mass medication with a combination of LAO and SRS tended to improve gains of cattle that were never sick (1.80 vs 1.65 lb/head/day). Mass medication with LAO reduced (P<.05) the number of sick days per head by 41% (2.56 vs 4.34 days/head). A combination of LAO and SRS reduced (P>.05) the number of sick days per head by 22.8% (3.35 days/head). Administration of SRS alone did not affect the number of sick days per head (4.24 days). Morbidity was high in this experiment and all of the mass medication procedures only reduced it slightly. The greatest reduction in morbidity occurred with LAO (P<.05) which reduced it by 22.1% (46.9 vs 60.2%). In contrast to the results of experiment one, mass medication with LAO plus SRS in this experiment did not greatly reduce hospital pen days or morbidity.

Effects of the various mass medication treatments on the performance and health of the sick cattle in this experiment are summarized in Table 8. All three of the mass medication procedures tended to reduce the daily gains of the sick cattle with SRS reducing (P<.05) gains by 42.7% (.75 vs 1.30 lb/day). Weight gains were reduced by 22% and 23.7%, respectively, by LAO and LAO plus SRS. The number of treatments per sick head was increased by 17.6% with SRS (8.36 vs 7.11 days/head), whereas, LAO and LAO plus SRS reduced the number of treatments by 19.8%

Table 8. Effect of mass medication on daily gains, sick days, repulls and response to first treatment in sick cattle--Experiment Two.

	Controls	LAO	SRS	LAO + SRS
Number of head*	59	46	53	52
Daily gain*, lb	1.30[b]	1.01[ab]	.75[a]	.99[ab]
Sick days*	7.11[cd]	5.70[c]	8.36[de]	6.71[c]
Repulls, %*	26.9[de]	6.1[c]	40.0[e]	20.7[cd]
Response to first treatment, %*	70.8	76.8	50.0	65.7

*Expressed as LSMEANS.
[a,b]Means with different superscripts differ (P<.05).
[c,d,e]Means with different superscripts differ (P<.01).

Table 9. Effect of mass medication on feed intake and gain to feed ratio--Experiment Two.

	Controls	LAO	SRS	LAO + SRS
Number of pens*	4	4	4	4
Feed intake, lb*	14.76[b]	13.11[a]	13.60[a]	13.40[a]
lb gain/lb feed*	.101	.103	.086	.105

*Expressed as LSMEANS.
[a,b]Means with different superscripts differ (P<.10).

and 5.6%, respectively. Number of repulls (cattle that had to be treated more than once for respiratory disease) was significantly reduced (P<.01) by the administration of LAO (6.1 vs 26.9%) but repulls were increased by SRS by 48.7% (40.0 vs 26.96%). The response to first drug treatment was similar across groups except that SRS reduced response rates by 29.4% (50.0 vs 70.8%).

Feed intakes and gain to feed ratios for the four treatment groups are reported in Table 9. All three mass medication procedures reduced feed intake (P<.10) as compared to the control cattle. Gain to feed ratios were not altered by the administration of LAO or LAO plus SRS but were reduced by 14.9% with SRS medication.

Discussion

Mass medication with LAO and SRS improved weight gains and reduced sick pen days and morbidity in stressed cattle in experiment one. However, this same procedure did not affect the performance or health of cattle in experiment two. These results differed from those expected. One would expect mass medication to be of greater benefit in more morbid cattle than in cattle experiencing little sickness. However, this data suggest that mass medication is of little benefit in very morbid cattle (morbidity >50%).

Neither of these long-acting drugs maintain therapeutic blood levels past four days. Hence, mass medication would have limited benefit if the majority of the cattle became sick after the first week of the receiving period. But, in both of these experiments, the majority of the cattle requiring treatment were pulled within the first four days following processing. Thus, delayed sickness cannot account for the difference in response observed between the two experiments.

In experiment two, the administration of LAO alone reduced the incidence of sickness, the number of sick days per head, and the number of repulls. Since LAO costs only one-half as much as mass medication with both LAO and SRS, its use would be more economically advantageous. The administration of SRS alone tended to impair the health and performance of newly arrived cattle.

The economics of mass medicating cattle depend on the cost and success of conventional treatment, availability of labor, ability to detect sick cattle early, and the health status of cattle received. Mass medication at processing would not be economic for fresh, local cattle which experience delayed illness (7-14 days after arrival). Mass medication should reduce labor and drug costs, and increase performance for cattle which are severely stressed during long shipment.

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