Technical Bulletin

Information from Phibro Technical Services

Benefits of Feeding Deccox® in Starting Programs for Feedlot Cattle

Summary

Anticoccidial effects of Deccox in starter programs improve feed intake, health and performance.

- Deccox calves generated improvements in feed intake (45%) and feed efficiency (26%) for the first 7 and 28 days, respectively.[1]
- Deccox benefited newly arrived feedlot cattle by helping calves recover from stress and restore nutrients via increased feed intake during the starting period, with other associated positive impacts on performance and health.[1]
- The Deccox+ChlorMax® starting programs improved performance, carcass weight, and dressing percentage compared with feeding Rumensin® alone.[2]
- The Deccox+ChlorMax combination reduced respiratory morbidity and retreats during the entire grow-finish period, reducing use/costs of injectable therapeutics.[2]
- Deccox+ChlorMax also ameliorated the adverse impacts of lung lesions on daily gains and carcass weights compared to Rumensin fed alone.[2]

The starting period in a feedlot represents a critical transition phase that significantly impacts health and performance throughout the entire subsequent feeding period, especially for high-risk, ship-stressed, or light-weight calves. The primary challenge confronted in the starting period is recovery from stress associated with weaning, marketing, and shipping. In addition, animals are simultaneously subjected to additional stress associated with commingling, processing, and metabolic adaptation (from forage-based diet of structural carbohydrates to a finishing diet of readily fermentable carbohydrates). Consequences of concurrent stressors can be manifested as a reduction in feed intake, impaired immune system function, and increased disease incidence. A primary objective of any nutrition and health management program for starting cattle is to restore nutrients lost during shipping, marketing, and processing and to allow for adequate nutrient intake to meet both the demands for maintenance and a desired level of growth.

Restoration of lost nutrients is a primary objective of management programs for starting cattle.

Deccox (decoquinate) is an anti-protozoal, non-antibiotic feed additive approved for the prevention of coccidiosis caused by *Eimeria bovis* and *E. zuernii*. Prevention of coccidiosis with Deccox has been associated with reductions in morbidity and mortality from respiratory disease.[1] These health benefits may be related to reduction of suppressive effects that coccidia exert on the immune system, thus allowing calves to respond normally and effectively to secondary disease challenges like respiratory infections. Furthermore, cattle receiving Deccox in the absence of clinical coccidiosis have been shown to generate better average daily gain (ADG) and feed efficiency than non-medicated animals.[3,4]

Two research studies evaluated the effects of including Deccox in starting diets of feedlot cattle, with particular focus on intake, health, and performance responses.

Experiment Design: Study 1

A feedlot study was conducted to investigate the effects of adding Deccox to receiving diets of shipping-stressed feeder calves.[1] This trial is one of several studies that historically documented the positive impacts of Deccox on cattle performance.[1,3,5-7]

The study involved 201 steer and heifer calves transported over 1,200 miles in late winter to a university research facility in Texas. Upon arrival at the feedlot, calves averaged 386 lb BW and were randomly assigned to one of 2 treatment groups. One group was fed a non-medicated starter diet while the other group received Deccox in the feed at 54.25 g/ton (22.7 mg/100 lb BW) for 28 days. A non-medicated grower diet was fed to both groups for 28 additional days. Half of the calves were assigned to pens equipped with individual feed monitoring devices which recorded individual feed intake. Remaining calves were group-fed in their assigned pens. Parameters monitored and statistically analyzed during the study included body weight, dry matter intake (DMI), ADG, feed efficiency (feed/gain, F/G), and morbidity (ADG and F/G were calculated from on-truck weights of the calves rather than arrival weights).

Results: Study 1

Calves receiving Deccox in the starter ration began consuming feed sooner than calves fed the control diet (Figure 1), with 76% of calves in the Deccox group eating by day 2 compared to only 44% of calves in the control group. Average DMI during the first 7 days was improved ($P < 0.05$) by 45% for calves fed Deccox compared to controls (Figure 2; based on individual feed-monitoring devices).

Average DMI during the first week in the feedlot improved 45% for calves fed Deccox.

During the first 28 days of the study, calves fed Deccox demonstrated ($P < 0.05$) improved feed efficiency (F/G improved 25.6%) compared to calves receiving the control diet (Figure 3). No other differences were detected ($P > 0.05$) between overall treatment groups during the study.

Feed efficiency improved 26% during the 28-day starting period when Deccox was fed.

Calves used in this study were severely stressed by transportation (transit shrink was 6.54%). Morbidity during the study was high with 78% of the Deccox group and 83% of the control group receiving treatment for bovine respiratory disease (BRD). Mortality was also high (17.4%), but calves receiving Deccox in the feed had less mortality (13.9%) than control calves (22.0%), possibly because the Deccox-medicated cattle consumed feed quicker and were thus better able to combat BRD. No signs of clinical coccidiosis were reported. Results of this study suggest Deccox can benefit newly arrived feedlot cattle by helping animals recover from stress and restore nutrients via elevated feed intake during the starting period, with other associated positive impacts on performance and health.

By elevating feed intake, Deccox can help starting cattle recover from stress and restore lost nutrients.

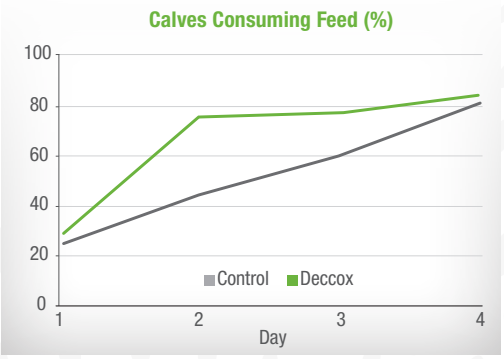


Figure 1. Percent of Starting Calves Consuming Feed During the First 4 Days in the Feedlot

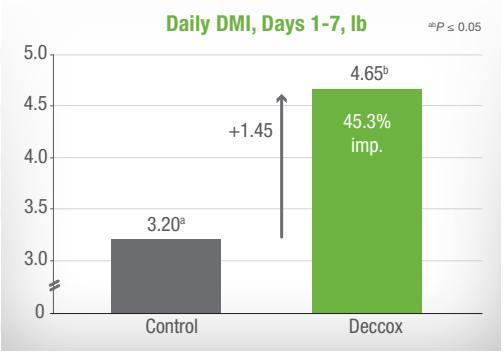


Figure 2. DMI of Starting Calves During the First 7 Days (Individual Feed Monitoring Devices)

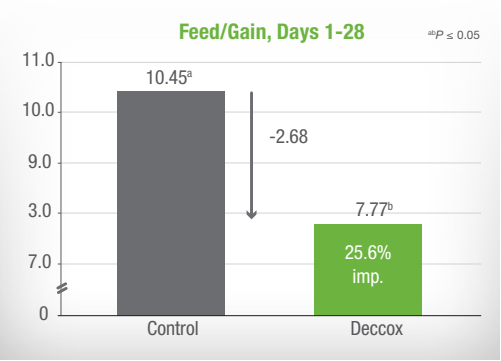


Figure 3. Feed Efficiency (Feed/Gain) of Starting Calves During the First 28 Days

Experiment Design: Study 2

Bovine respiratory disease, like coccidiosis, can occur with obvious clinical signs of overt infection, or as only a mild, inapparent, subclinical form of illness. In research studies, lung lesions indicative of a bacterial insult were detected at slaughter in approximately 50% of cattle that did not exhibit clinical signs of BRD.[8,9] Lesions were associated with decreased ADG, reduced quality grade, and increased toughness of the longissimus dorsi muscle.

Supplementation of cattle diets with Chlormax (chlortetracycline, CTC) has been shown to inhibit the growth of respiratory pathogens[8] and reduce BRD morbidity while maintaining performance.[10] Currently, ChlorMax is approved for use in combination with Deccox.

The 220-day study involved Angus or Angus × Hereford steers purchased in South Dakota and shipped to a commercial feedlot in the Texas panhandle region.[2] The 1,827 high-risk calves were received in 2 groups (Nov 1-2 for blocks 1-3, Nov 6-7 for blocks 4-6). Arriving calves were individually weighed and processed (vaccinations, internal and external parasite treatment, vitamins, tilmicosin injection at 1.5 cc/100 lb BW for metaphylactic BRD treatment, Revalor®-IS implant). A total of 1,690 healthy-appearing steers weighing between 440 and 660 lb were enrolled in the study and randomly assigned to one of 18 pens. The study employed a randomized complete block design with 'pen' as the experimental unit. A 3-step diet transition scheme was employed during the starting period to adapt cattle to the finishing diet by day 30 (35%, 27%, and 18% DM-basis roughage for steps 1, 2, and 3, respectively). Each diet transition was made over a 2-day period. The 3 transition diets also included Rumensin® (monensin), stepped up from 15 to 20 to 25 g/ton of feed (DM basis) during the starting period.

Three treatments were evaluated during the starting period of the study (6 pens/ treatment):

- Deccox+ChlorMax Early (n = 579): Deccox+Rumensin fed 28 days with 2 or 3 treatment periods of ChlorMax* (initially fed 'early' starting on day 0; Table 1)
- Deccox+ChlorMax Late (n = 555): Deccox+Rumensin fed 28 days with 2 treatment periods of ChlorMax* (initially fed 'late' starting on days 6/7; Table 1)
- Rumensin control (n = 556): Rumensin fed alone during the first 28 days (Table 1)

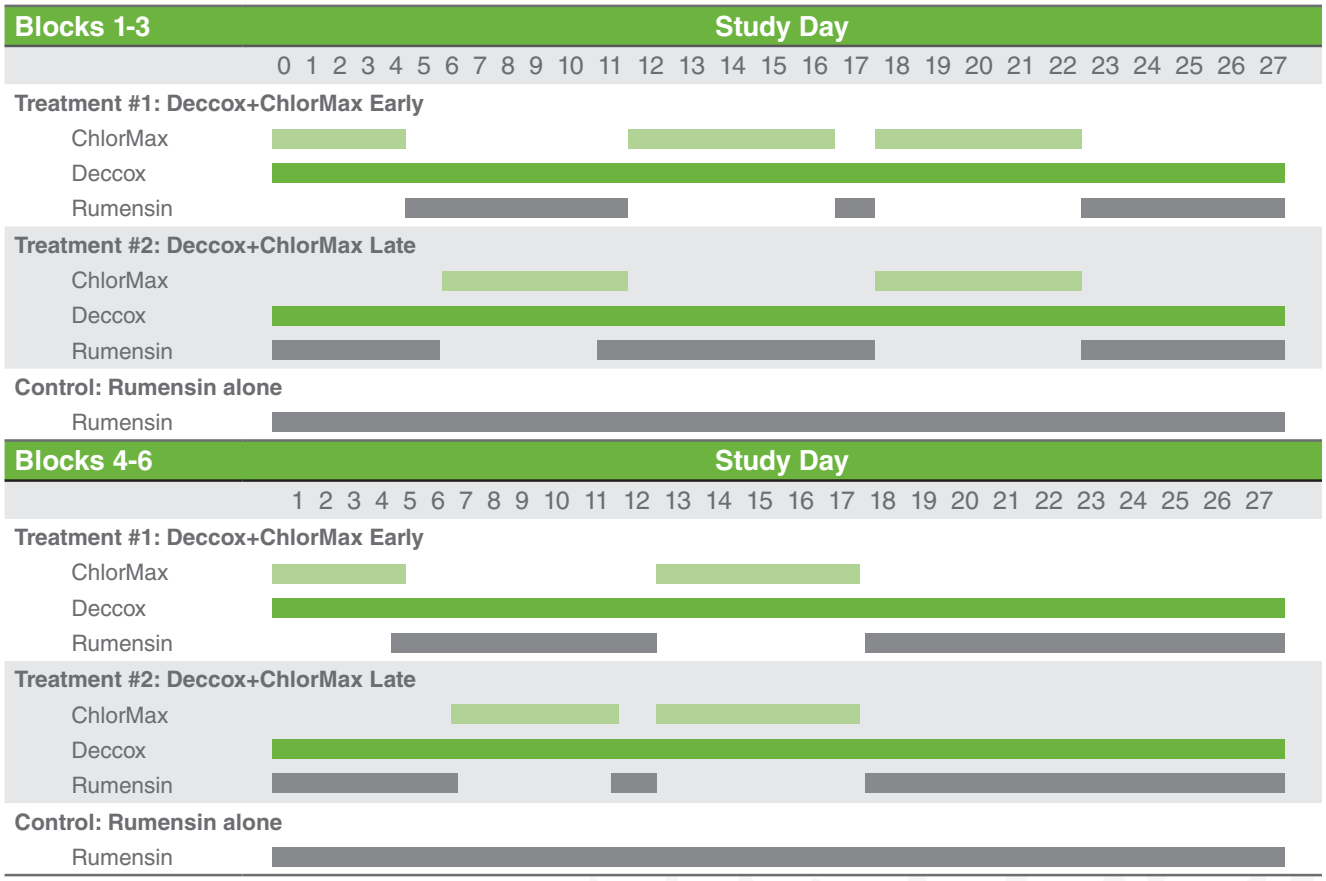
(*Rumensin was removed from rations during ChlorMax administration.)

ChlorMax was fed at a therapeutic level of 10 mg/lb BW.

Deccox was fed at 22.7 mg/100 lb BW and ChlorMax was fed at the therapeutic level of 10 mg/lb BW. All cattle were transitioned to the finishing diet containing Rumensin (33.3 g/ton DM basis) and Tylan® (tylosin; 11.1 g/ton DM basis) starting December 10. Steers were re-implanted with Revalor®-S and individually weighed in mid-February. Mean exposure to the terminal implant was 124 days.

Cattle were observed daily for signs of morbidity. If intake dropped and/or pull rate increased, cattle on the Deccox+ChlorMax treatments were eligible for additional CTC treatments. However, after day 28 of the study, cattle were not eligible to receive Deccox or ChlorMax regardless of BRD or coccidial morbidity. This morbidity protocol resulted in at least one additional 5-day therapy with CTC for both of the Deccox+ChlorMax treatment groups (Table 1). Morbidity was visually assessed by experienced personnel based on respiratory abnormalities (increased/labored respiratory and

Table 1. Experiment Design — Medications Fed During a 28-day Starting Period



expiratory effort, cough or other expiratory noise, purulent nasal discharge), attitude (depression, muscle weakness, reluctance to rise, uncoordinated movement), and other signs (dull eyes, drooping head/ears, excessive salivation/lacrimation). Rectal temperature was recorded for all respiratory cases brought to the hospital for treatment, and therapeutic regimens (3 different, sequential injectable agents) were the same for all 3 treatment groups. Mortalities were necropsied on site for presumptive cause of death.

Initial weights were the pen weights obtained after processing each block of cattle. Interim and final weights were scale weights at the research facility. Final pen weights were pencil-shrunk 4% and used to calculate performance parameters and dressing percentage. Individual carcasses were assessed at market for quality, liver abscesses, and lung lesions (none, minor ≤ 20% involvement, severe >20% involvement). Pulmonary scores were collected on 1,480 steers. Appropriate statistical analyses were performed on collected data. Performance parameters (carcass adjusted, dead/removals excluded), hot carcass weight, and dressing percentage were evaluated on a pen basis. Effects of respiratory disease and lung lesion status on performance and carcass characteristics were analyzed using the individual animal as the experimental unit.

Results: Study 2

Performance and Carcass Parameters

No differences ($P > 0.10$) were detected between the 'early' and 'late' Deccox+ChlorMax treatment groups for performance and carcass data presented in Table 2. Therefore, the Deccox+ChlorMax results represent least squares means of the combined groups, and statistical probability values represent the orthogonal contrast comparing the mean of Deccox+ChlorMax Early and Deccox+ChlorMax Late groups vs the Rumensin control group.

Deccox+ChlorMax improved final BW by 15 lb compared to Rumensin fed alone.

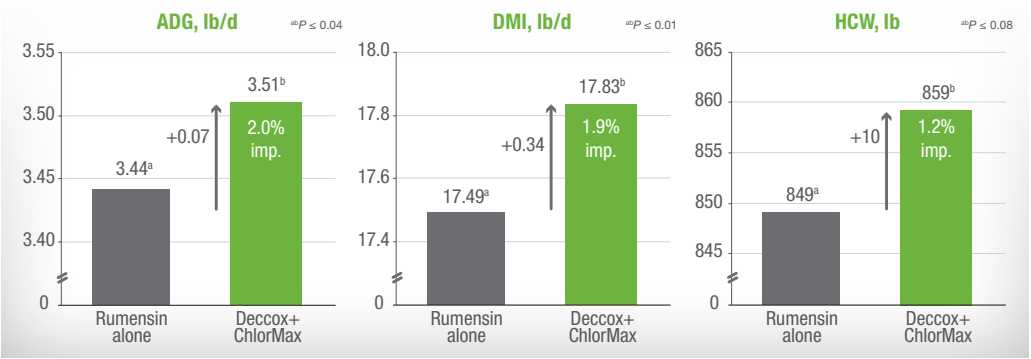


Figure 4. Performance Results for Cattle Fed Deccox+ChlorMax vs Rumensin Alone During the Starting Period

Table 2. Performance and Carcass Results for Calves Fed Deccox+ChlorMax vs Rumensin During the Starting Period

	Rumensin alone	Deccox+ ChlorMax
Initial BW, lb	552	553
Re-implant BW, lb	868[a]	882[b]
Final BW, lb	1311[x]	1326[y]
ADG, lb/d	3.44[a]	3.51[b]
DMI, lb/d	17.49[a]	17.83[b]
Feed/gain, DM basis	5.08	5.085
Dressing percentage	64.6[a]	64.9[b]
Hot carcass weight, lb	849[x]	859[y]

[ab] Values in rows significantly different ($P \leq 0.05$)
[xy] Values in rows significantly different ($P \leq 0.10$)

Feeding Deccox with periodic 5-day treatments of ChlorMax during the 28-day starting period improved interim (reimplant) and final weight gains by 14 lb ($P \leq 0.03$) and 15 lb ($P \leq 0.08$), respectively, compared with the Rumensin treatment (Table 2). Improvements in final weight resulted from a 2.0% improvement in ADG (0.07 lb/day; $P \leq 0.04$) for cattle fed Deccox+ChlorMax compared with animals fed Rumensin alone (Table 2, Figure 4). Greater gain and final live weight occurred partially because of 1.9% greater DMI (0.34 lb/day; $P \leq 0.01$) for cattle fed Deccox+ChlorMax compared with those fed Rumensin (Table 2, Figure 4). No differences in feed/gain were observed between treatment groups.

Cattle fed Deccox+ChlorMax produced carcasses 10 lb heavier than steers fed Rumensin.

Dressing percentage was improved 0.3% ($P \leq 0.03$) for the Deccox+ChlorMax vs Rumensin treatments. The combination of increased live weight and greater dressing percentage which resulted in 10 lb of additional carcass weight per head ($P \leq 0.08$) for cattle fed Deccox+ChlorMax during the starting period compared to calves fed Rumensin alone (Table 2, Figure 4).

Respiratory Health Parameters

Cattle fed Deccox+ChlorMax experienced a 38% reduction ($P \leq 0.01$) of respiratory cases during the starting period, and a 27% reduction ($P \leq 0.01$) of unique case throughout the grow-finish feeding period (Table 3). The number of repulls was also reduced by 51% ($P \leq 0.01$) for cattle fed Deccox+ChlorMax compared with the Rumensin-alone control treatment. These improvements in respiratory health obviously helped lower overall production costs by reducing the need for expensive injectable therapeutic regimens.

Overall respiratory morbidity fell 27% for cattle fed Deccox+ChlorMax and repulls were reduced by 51%.

Lung Lesion Status

Though Deccox+ChlorMax did not affect the number or severity of lung lesions compared with Rumensin, the use of Deccox+ChlorMax ameliorated the impact of lung lesions on performance (ADG) and carcass weight compared with Rumensin fed alone (Figures 5 and 6).

Minor lung lesions in cattle fed Deccox+ ChlorMax during the starting period had no impact on individual ADG or carcass weight compared to animals with no lesions. In contrast, minor lung lesions in cattle that received Rumensin alone during the starting period resulted in average ADG reductions of 0.17 lb/d and carcass weight reductions of 23 lb. Cattle with minor lesions that had been fed Deccox+ChlorMax experienced improvements in both ADG (0.13 lb/d; $P \leq 0.06$) and HCW (21 lb; $P \leq 0.02$) compared to animals fed only Rumensin.

The presence of severe lung lesions reduced ($P \leq 0.01$) both ADG and HCW in all animals compared to cattle with no lesions (0.18 lb/d and 27 lb for Deccox+ChlorMax, 0.36 lb/d and 50 lb

Table 3. Morbidity and Mortality/Removals of Calves Fed Deccox+ChlorMax vs Rumensin During the Starting Period

	Rumensin alone	Deccox+ ChlorMax
Initial head count, n	556	1134
Respiratory cases, %		
< 30 days on feed	11.3[a]	7.0[b]
> 30 days on feed	12.1	10.1
Total unique cases	23.4[a]	17.0[b]
Respiratory repulls *(% of unique cases)*	22.3[a]	10.9[b]
Respiratory mortality, %	3.8	2.5
Mortality & removals, %	4.7	3.4

[ab] Values in rows significantly different ($P \leq 0.05$)

Figure 5. Impact of Deccox+ChlorMax vs Rumensin Fed During the Starting Period on ADG as Associated With Lung Status

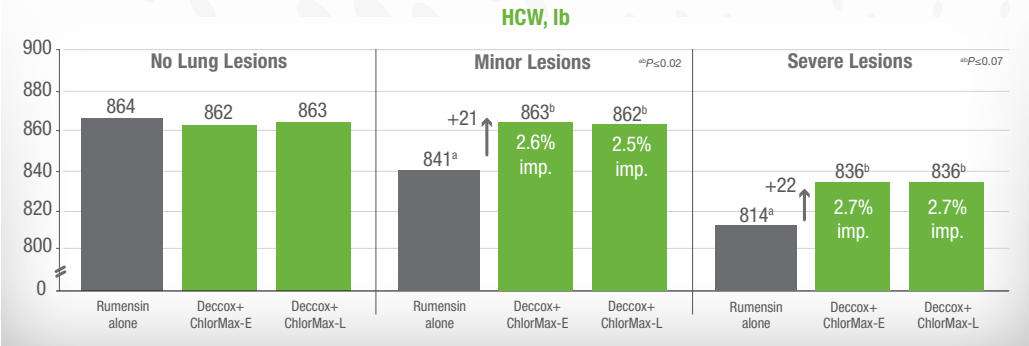


Figure 6. Impact of Deccox+ChlorMax vs Rumensin Fed During the Starting Period on Carcass Weight as Associated with Lung Status

Deccox+ChlorMax during the starting period helped minimize impacts of lung lesions on ADG and carcass weight.

for Rumensin, respectively). However, the negative effects of severe lesions were much worse for cattle fed Rumensin alone compared to those fed Deccox+ChlorMax. In cattle with severe lesions, Deccox+ChlorMax administration during the starting period improved ADG 0.14 lb/d ($P \leq 0.14$) and carcass weight 22 lb ($P \leq 0.07$) compared to Rumensin alone.

Summary of Deccox+ChlorMax Benefits

The Deccox+ChlorMax starting programs resulted in the following benefits compared to feeding Rumensin alone:

- Final weight gain improved 15 lb/hd
- ADG improved 0.07 lb/d
- DMI improved 0.34 lb/d
- Dressing percentage improved 0.3%
- HCW improved 10 lb
- Respiratory cases during the starting period reduced 38% (7.0% vs 11.3%)
- Total unique cases of respiratory disease reduced 27% (17.0% vs 23.4%)
- Repulls reduced 51% (10.9% vs 22.3%)
- Reduced impact of lung lesions on performance and carcass weight

Conclusions

A 56-day university study showed that severely stressed feedlot calves fed a 28-day Deccox starting program began consuming feed sooner after arrival compared to non-medicated cattle and generated improvements in DMI (45%) and feed efficiency (26%) for the first 7 and 28 days, respectively. Deccox benefited the newly arrived feedlot cattle by helping animals recover from stress and restore nutrients via elevated feed intake during the starting period, with other associated positive impacts on performance and health.

A 220-day growing-finishing trial was conducted to determine the impact of 28-day starting programs using Deccox combined with ChlorMax (fed early or late in the starting program) on steer performance and health compared with feeding Rumensin alone (cattle on the Deccox+ChlorMax programs also received Rumensin, except during the 5-day periods of CTC administration). No substantive differences were observed between initially feeding CTC early or later in the starting program. However, the Deccox+ChlorMax combination improved animal performance, carcass weight, and dressing percentage compared with feeding Rumensin alone. Further more, the Deccox+ChlorMax programs reduced the number of cattle that were initially morbid or retreated during the study, resulting in reduced injectable medication costs (fewer morbid cattle and fewer repulls). The combination of Deccox+ChlorMax effectively ameliorated the adverse impacts of lung lesions on ADG and HCW compared to Rumensin fed alone. Study results clearly demonstrate that improved intake, health, performance, and carcass-quality advantages can be achieved by including Deccox or Deccox+ChlorMax in starting diets for arriving cattle, particularly for stressed calves, cattle shipped long distances, or lightweight calves entering feedlots. Use of Deccox in starting cattle diets offers feedlot managers a tangible opportunity to lower production costs and elevate profit potential while optimizing the health of their herds.

In cattle with lesions, Deccox+ChlorMax improved HCW 22 lb compared to Rumensin fed alone.

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This information has been prepared for industry technical professionals.