Cost Benefits of Coccidiosis Prevention in a Feedlot

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The objective of today's food animal enterprise is to produce a quality product while at the same time providing maximum economic return to the producer. Many factors are involved, including herd health programs, which work to maintain animal health and to decrease economic losses due to disease. A herd health preventive medicine program will increase the costs of production, but it will increase the economic returns if the level of performance is improved.

It is a fact of human nature that producers are more willing to pay to treat clinically ill animals where success is readily visible, but more reluctant when the results are less obvious. Most losses in productivity and economic returns result from the subclinical diseases that do not cause overt clinical signs, but do affect the animals so as to reduce their efficiency.[1] Therefore, producers stand to lose more when the disease entity is less visible and more insidious, because these affected animals will usually go unnoticed and untreated.

Coccidiosis is an enteric disease which can be clinically inapparent in a feedlot. The classical clinical signs are bloody diarrhea and severe weight loss, but often it can be inapparent with only non-specific clinical signs of a loose, foul-smelling stool. It can strike a feedlot resulting in morbidities of 5 to 40%.[2] There are few mortalities, but the major effects of the disease are the intestinal lesions, which are severe enough to require several weeks for the animal to recover normal body weight and feed consumption.

Many producers who have experienced coccidiosis in their feedlots will argue that it is more economically beneficial to treat the clinically ill animals rather than prevent the problem by feeding conccidiostats to the entire pen.

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On the surface, their arguments appear valid. There is less out-of-the-pocket cost in treating individuals rather than preventing coccidiosis on a whole pen basis. But this argument is invalid because in experiencing an outbreak, one must consider the costs due to lost production in addition to treatment costs. These are morbidity losses that usually are not felt until the cattle are sold. It is obvious that by this time it is too late to change the performance on this pen, so the producer has to accept these losses and make changes on the next pen of cattle.

Are the losses in an outbreak of coccidiosis in a feedlot significant enough to warrant preventive measures? Would these preventive efforts be cost beneficial in the end? In order to answer these two points, a hypothetical model was constructed to figure the cost benefits. These cost benefits can be figured on any feedlot.

Model

This hypothetical model is a feedlot operation of 200 head per pen. The incoming feeders are 600 pound steers that are in good health. Purchase prices are figured at $80.00 per hundredweight. Frame size and other genetic factors are considered to be equal throughout the whole pen of steers. The steers will be fed for 225 days to reach a finishing weight of 1250 pounds. The entire pen will be sold when the steers reach an average of 1250. pounds.

All the steers will be assumed to have equal susceptibility of coccidiosis. No deaths other than those due to coccidiosis will be taken into account. The cattle will be observed for signs of illness twice daily by experienced personnel. All coccidiosis-affected cattle will be pulled and treated by the feedlot personnel. Therefore, for purposes of this discussion, morbidity equals number treated. No preventive measures, including coccidiostats in the feed (decoquinate, monensin, lasalocid, etc.), will be considered unless otherwise stated.

The fixed and variable costs are figured at an average of $1.50 per head per day.[3] The total fixed and variable costs for the feeding period

are considered to be equal between pens on a per head per day basis; therefore, all costs related to coccidiosis are in addition to these. The fixed and variable costs include feed, average veterinary costs, machinery, equipment, interest, labor, depreciation, but excludes the purchase price of the feeder steers. The costs of drugs and feed additives are those available from the Iowa State University Veterinary Teaching Hospital.

There were many factors not considered in this model, such as weather, facilities, type of ration fed, and client cooperation. It was assumed that all factors between pens of cattle would be equal and optimal.

By establishing a standard model, a comparison can be made between a pen in which preventive measures against coccidiostats are taken and a pen in which no prevention is used, and the resulting outbreak of coccidiosis is treated on an individual basis.

Preventive Pen - (Table 1)

This pen represents a situation where coccidiosis is totally controlled through the use of coccidiostats in the feed. The steers are placed on decoquinate mixed into the feed starting on the day of arrival. Decoquinate (Cocci Guard 10x Supplement, Iowa Veterinary Supply) is fed at a level of 22.7 mg per 100 pounds of body weight. It is fed at this level as the sole coccidiostat for the first 21 days and is then overlapped with monensin for another 14 days for a total of 35 days of decoquinate in the feed. It is considered that the addition of the decoquinate into the ration will require extra labor, so an additional labor cost is included. In looking at Table 1, one can see that it takes a total of 2 pounds of decoquinate per head for the feeding period at a cost of $2.24 per head.

Monensin is commonly used in feedlot rations to improve feed efficiency. The initial dose in the ration is low and it is gradually increased until a dose of 200-300 mg per head per day is reached. Monensin also inhibits coccidiosis, however, a somewhat higher level of intake may be necessary for this effect. It is assumed that 245 mg/hd/day will be fed for increased feed efficiency, and that an additional 40 mg will be fed for the purpose of control. Table 1 depicts that a total of 8000 mg per head is required for the feeding period and the cost is $1.40 per head.

A total cost (in addition to other costs held constant) of $3.90 per head was calculated for this pen where the use of preventive coccidiostats is presumed to control coccidiosis completely. If coccidiosis were not completely controlled by the coccidiostats, it would obviously be less beneficial to spend this extra cost for prevention.

Outbreak Pen - (Table 2)

This pen represents a feedlot situation where no coccidiostats or ionophores are used, and the steers are treated individually as they break with coccidiosis. A morbidity of 5% is used for purposes of comparison. It has been said that with feedlot pneumonia, a 10% morbidity in a pen will result in 15 extra days of feed per head.[4] We will presume that feedlot coccidiosis has a similar effect on feedlot production. With a 5% morbidity, there will be an average of 7.5 days extra on feed per head.

To attribute dollar values to these morbidity losses, the $1.50 per days for average fixed and variable costs is used. The total cost for the loss of 7.5 days per head is $11.25 per head. Provided that the correlation between morbidity and extra days on feed is correct, a morbidity of 10% would double morbidity costs and a morbidity of 2.5% would halve morbidity costs. Regardless of the percentage of morbidity experienced, this loss is significant and represents a large portion of the costs incurred in an outbreak.

With a 5% morbidity in this pen, 10 steers would become clinically ill and be treated. It is assumed that feedlot personnel, who are trained and working under veterinary supervision, will pull sick cattle and treat them themselves in order to save on costs. Assuming that cattle are affected early in the feeding period, a weight of 600 pounds is used to figure drug dosages and costs. If the cattle are heavier, treatment costs will increase, but only minimally.

A treatment regimen of a single dose of injectable sulfadimethoxine and subsequent boluses of sulfadimethoxine are sulfaquinoxaline is chosen. Treatment #1 included sulfadimethoxine injectable (Albon, Hoffman-LaRoche) and sulfadimethoxine boluses (Albon S.R. Boluses). The advantage of this treatment is that a single dosing with the Albon S.R. boluses is adequate for routine coccidiosis treatment. The disadvantage is the long slaughter withdrawal time

that is required on the boluses, which is 21 days.

Treatment #2 used the Albon injectable but incorporates sulfaquinoxaline boluses (BoviCox, Osborn) instead. The advantage of this treatment is the shorter slaughter withdrawal time (10 days), but its disadvantage is that the BoviCox boluses must be given every day for 3 to 5 days. Because of this fact, an additional labor expense is included, taking into account the additional time required to sort and treat the cattle for 3 days in a row versus a single day treatment. The cost for treatment #2 is used in the total outbreak cost, since it is the higher of the two treatments.

The only mortalities occurring in this pen are attributed to coccidiosis. It is figured that at least one 600 pound steer will die in 5 years (1 steer out of a total of 1,000 steers), assuming that there is a coccidiosis outbreak every year. The mortality loss results in a cost of $0.48 per head across all the cattle fed in the 5 year period.

The total costs for the outbreak pen amount to $13.16 per animal fed. It is important to realize that the majority of this cost is the cost of morbidity. If this cost is removed, the cost of an outbreak in this pen would only by $1.91 per head, which is about half the cost of prevention.

Unlike the preventive pen, where the costs are fairly regular or fixed, the costs on the outbreak pen will vary greatly depending on the incidence of coccidiosis. Coccidiosis can be a recurring problem, or it can occur once then never occur again for another 10 to 20 years. If the incidence is low, it may be more economically advantageous to live with the coccidiosis rather than to prevent it.[5]

Another variable that affects outbreak costs is treatment costs. Perhaps a producer favors one treatment over another, or perhaps he prefers to have his veterinarian handle all the treatments. Either of these two can change treatment costs.

Outbreak costs are also affected by mortality losses. One producer may never experience mortality losses due to coccidiosis, while another producer may lose up to 10% of the cattle affected. Depending on the size of the operation, these losses may or may not be significant.

One can see that there are many variables to this model, all of which can affect the final outcome. The model used is a static representation of a very dynamic process. Both animal production and disease are two very active entities. For this reason, the cost benefits for any disease prevention will vary between feedlots, between fiscal years, and between pens of cattle. Accurate records and regular veterinary involvement are necessary for appropriate decision-making for specific individual feedlots.

Summary

In comparing the total coast of the preventive pen (Table 1) to the total cost of the outbreak pen (Table 2), it would cost a producer more to live through the coccidiosis outbreak than to prevent overt clinical signs. This is based on a per-head comparison.

A producer may determine the success or failure on a pen of cattle by determining the break-even price. The best scenario is to have a low break-even price and high sale price so that maximum profit can be made. Comparing the break-even price on the preventive pen with that of the outbreak pen shows that there is a $0.74 per hundredweight difference (Table 3). For example, if the steers sold for $75 per hundredweight (cwt), the preventive pen will profit by $7/cwt if the break-even price is $68.00. However, the outbreak pen will have a break-even price of $68.74 and will profit by only $6.26/cwt. This may seem to be of little significance until you consider that by spending $0.31/cwt extra for prevention, one can save $0.734/cwt by eliminating coccidiosis outbreaks. A return on investment of approximately 2.5:1.

It should be remembered that preventive costs are fixed and regular whereas outbreak costs vary greatly. A producer can count on spending $0.31/cwt extra for prevention every year but may never spend the extra $1.05/cwt for an outbreak if he is successful in that preventive strategy. In looking at Table 3 again, the cost of only one coccidiosis outbreak would pay for three years of coccidiosis prevention. If a producer experiences a coccidiosis outbreak every three years or less, if would be economically beneficial to use coccidiosis prevention.

Another method of comparison between the two pens would be by profit or net income based on a pen basis (Table 4). Here the costs are subtracted from the income to yield the net profit (income). The profit that is made on the preventive pen is $23,220. The outbreak pen has a profit of $21, 368, a difference of $1852. If no prevention were used and there were no out-

breaks of coccidiosis, the profit on the pen would have been $24,000. There is a difference of $780 between the preventive pen and the no prevention/no outbreak pen. In a feedlot where coccidiosis rarely occurs, this difference in cost would be viewed unreasonable, and the producer may chose to do without coccidiosis prevention. However, if a coccidiosis outbreak does occur, it would be foolish for a producer to spend $2630 to treat the outbreak when it could have been prevented for only $780. This again is a situation where veterinary input is crucial to a risk management decision.

Conclusion

Today's cattle feeding economy requires that a producer be as efficient as possible. Producers are forced to watch their bottom line very carefully and take steps to reduce their risk of losses. As veterinarians, we are called upon to reduce their losses due to disease. An effective way of doing this is to implement preventive herd health programs.

A preventive herd health program will increase costs initially, but this will be counterbalanced later when the returns are increased due to improved performance. The costs of prevention remain fixed and regular whereas the costs of a disease outbreak are variable. A producer foregoing a prevention program in favor of a treatment-as-needed program will experience larger profits if disease doesn't occur in his feedlot. On the other hand, if disease does occur, the losses can be significant. Most capital intensive producers can't afford to take this risk.

Coccidiosis can cause significant losses in a feedlot whether clinical signs are visible or not. To many producers, however, the thought of spending an extra $4.00 per head out-of-pocket for coccidiosis prevention is rather unattractive. This reaction may be appropriate when they experience coccidiosis outbreaks only occasionally.

Other producers may favor coccidiosis prevention. They understand that coccidiosis can affect their bottom line invisibly through decreased performance, longer days on feed, and variability in market weights. With tight budgets, narrow margins and profits based on volume, a few cents lost in an outbreak will have enormous consequences.

It is very difficult to assign a benefit value to a preventive coccidiosis program. These benefits will very between feedlots and even within the same feedlot. Designing a hypothetical model allows one to make comparisons based on a situation, and under strict controls. In order to evaluate cost benefits adequately, a feedlot should be evaluated over a period of time with the benefit of accurate production and cost data. The decision to use preventive programs rests with the producer. Veterinarians should not only aid the producer by diagnosis and treatment of diseases, but should also help in reducing losses due to disease morbidity and mortality through records maintained by the veterinarian. A working knowledge of how a feedlot operates and the understanding of how morbidity causes losses, will make a veterinarian a valuable asset to any feedlot operation.

References

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Table 1 - Preventive Pen

200 head, 600 pound steers
End weight 1250 pounds, 225 day feeding period

Fixed and variable costs: Held constant

Coccidiostat costs:
Decoquinate (Cocci Guard)[a]
Dose = 22.7 mg/100 lbs.
22.7 x 6 cwts = 136 mg/head x 2270 mg/lb supplement
= 0.06 lb. supplement x 35 days treatment = 2 lb/head/period
$53.50/50 lb. x 2 lb. = $2.24/head/period

Monensin (Rumensin)[b]
Total dose = 240 mg/head/day
= 40 mg for coccidiostat effects
40 mg x 200 total days fed = 8000 mg/head
$7.00/50 lb. (40 grams/50 lbs.) = $1.40/head/period

Total Coccidiostat costs: $2.24 + $1.40 = $3.64

Labor costs for adding Decoquinate:
0.25 hrs. (15 min)/day x 35 days = 8.75 hrs.
8.75 hrs. x $6/hr. = $52.50 for total labor
$52.50/200 head = $0.26/head/period

Total Cost for Preventive Pen
$2.24 + $1.40 + $0.26 = $3.90

[a] Cocci Guard 10x supplement, Iowa Veterinary Supply, Iowa Falls, Iowa 50126

[b] Rumensin, Elanco Products Company, Greenfield, Indiana 46140

Table 2 - Outbreak Pen

200 head, 600 pound steers
End weight 1250 pounds, 225 day feeding period

No preventive coccidiostats used. No monensin or lasalocid fed.

Fixed and variable costs: held constant

Cost of Morbidity:
5% morbidity = 7.5 days extra on feed/head for entire pen
7.5 days x $1.50 average fixed and variable costs/day = $11.25/head

Cost of Treatment:
5% morbidity x 200 head = 10 head affected and treated,
Pulls and treatments handled daily by feedlot personnel

Treatment #1
sulfadimethoxine (Albon)[a] injectable - 1 cc/25 lb.
600 lb. - 24 cc x $0.20 = $4.80
sulfadimethoxine (Albon S.R.)[b] boluses - 1 bolus/200 lb.
600 lb - 3 boluses x $1.65/bolus = $4.95
total drug cost - $4.80 =$4.95 = $9.75/sick head
Pen basis - $0.49/head
Labor for treatment #1 - 1 hr/sick head x $6.00/hr. = $6.00/sick head
Pen basis - $0.30/head
Total costs: $0.49 + $0.30 = $0.79/head

Treatment #2
sulfadimethoxine (Albon)[a] injectable - 24 cc = $4.80
sulfaquinoxaline (Bovicox)[b] boluses - 1 bolus/200 lb/day
600 lbs - 3 boluses x 3 days = 9 boluses
9 boluses x $0.65/bolus = $5.85
total drug cost - $4.80 + $5.85 = $10.65/sick head
Pen basis - $0.53/head
Labor for treatment #2
3 hrs/sick head x $6.00/hr = $18.00/sick head
Pen basis - $0.90/head
Total costs: $0.53 + $0.90 = $1.43 head

Cost of Mortality
0.1% mortality - lose 1 600 lb. steer every five years
= 600 lb x $80/cwt = $480/5 years = $96/year/200 head
= $0.48/head

Total costs for outbreak pen:
$11.25 + $1.43 + $0.48 = $13.16/head

[a] Albon, Hoffman-LaRoche Inc., Nutley, New Jersey 07110
[b] BoviCox, Osborn Labs, Essar Corp., Fort Dodge, Iowa 50501

Table 3 - Comparison by Break-Even Prices

Preventive Pen:
200 head at 1250 lb. = 250,000 lbs. or 2500 cwt
coccidiostat cost = $3.90/head x 200 head = $780/pen
$780/2500 cwts = $0.31/cwt extra spent

Outbreak Pen:
200 head at 1250 lbs. = 2500 cwts
Outbreak costs = $13.16/head x 200 head = $2632/pen
$2632/2500 cwts = $1.05/cwt extra spent

Difference:
$1.05 - $0.31 = $0.74/cwt

Conclusion:
The outbreak pen has a higher break-even price than the preventive pen. For example, if the break-even price for the preventive pen is at $68.00, the outbreak pen will have a break-even price of $68.74. Therefore, these steers will have to be sold for $0.74 more per hundred weight in order to make the same profit as the preventive pen.

Table 4 - Comparison by Profit

Preventive Pen:
1250 lb x $75/cwt = $937.50 income/head
fixed and variable costs for 225 days = $1.50 x 225 = $337.50/head
$337.50 + $480 purchase price = $817.50/head for total period
coccidiostat cost = $3.90/head
Net profit = $937.50 - $817.50 - $3.90 = **$116.10/head profit**
$116.10 x 200 head/pen = **$23,220 profit on pen**

Outbreak pen:
1250 lb x $75/cwt = 937.50 income/head
fixed and variable costs + purchase price = $817.50/head
outbreak costs + $13.16/head
Net profit + $957.50 - $817.50 - $13.16 = **$106.84/head profit**
$106.84 x 200 head/pen + **$21,368 profit on pen**

Difference:
$23,220 - $21,368 + $1,852

Conclusion:
Experiencing an outbreak of coccidiosis where there is 5% morbidity, and all of these animals are treated, will result in $1,850 less profit than if preventive measures had been taken.