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Update on the Economics of Feeding Ractopamine (Paylean™) to Finishing Pigs

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Summary and Implications

Ractopamine is a feed additive that improves feed efficiency, daily gain, and carcass merit in finishing pigs. An economic feasibility analysis on the feeding of 4.5 and 9.0 g/ton ractopamine to finishing pigs fed a 1% lysine, corn-soybean meal diet for an average of 29 days before slaughter was conducted. The analysis was performed in two stages: 1) an economic benefit for ractopamine was calculated from revenues due to improved feed efficiency, daily gain and carcass yield (dressing percent), and 2) the amount of a carcass lean premium needed per pig to recover the added cost of feeding ractopamine was calculated for each dietary level of ractopamine. One pound of Paylean™, containing 9 grams of ractopamine per pound, cost $28 and live slaughter pig prices were $34, $42, and $50/cwt. In 10/12 of our evaluations, the cost of feeding ractopamine cannot be justified economically through improved feed efficiency, daily gain, and carcass yield alone (corn =$2.00/bu; soybean meal = $200/ton). A producer would need to earn carcass lean premiums ranging from $0.23 to $1.78/pig in order to recover the cost of feeding ractopamine. However, we projected a potential profit of $0.55 and $1.50/pig from feeding 9 g/ton ractopamine when live slaughter price was $42 and $50/cwt, respectively, and when ractopamine-fed pigs were allowed to reach a heavier body weight at slaughter. We conclude that a consistent carcass lean premium is necessary sometimes to justify feeding ractopamine economically and that it can improve profitability of pork production.

Introduction

Ractopamine (Paylean™; Elanco Animal Health) was approved by the Food & Drug Administration (FDA) in 1999 for increased rate of gain, improved feed efficiency, and increased carcass leanness in finishing pigs fed a complete diet containing at least 16% crude protein (0.82% lysine) from 150 to 240 lb. The additive can be included in a finisher diet at 4.5 to 18.0 g/ton.

In the 2001 Nebraska Swine report we estimated the value of feeding ractopamine to finishing pigs. We concluded that a consistent carcass premium was necessary to justify feeding ractopamine economically. That conclusion was reached based on pig performance data generated during the late 1980's and early 1990's. Improvements have been made in the genetic merit of pigs since then that could affect the response to ractopamine. In

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Table 1. Effect of ractopamine (4.5 g/ton) on finisher pig performance.[a,b]

Item	Ractopamine, g/ton	
	0	4.5
No. pens	33	61
No. pigs	300	331
Daily gain, lb	2.17	2.35
Daily feed, lb	6.36	6.19
Feed/gain	2.97	2.65
Hot carcass weight, lb	200	202
Yield, %	74.7	74.5
Lean, %	56.4	56.8

[a]Means from Cook et al., 2001; Herr et al., 2001; and Main et al. 2001 weighted according to the number of pens/treatment.
[b]1.04% lysine diet; 29.2-day feeding period.

Table 2. Effect of ractopamine (9.0 g/ton) on finisher pig performance.[a,b]

Item	Ractopamine, g/ton	
	0	9.0
No. pens	39	97
No. pigs	357	668
Daily gain, lb	2.24	2.49
Daily feed, lb	6.59	6.34
Feed/gain	2.96	2.55
Hot carcass wt., lb	200	207
Yield, %	74.3	75.4
Lean, %	54.9	55.8

[a]Means from Cook et al., 2001; Herr et al., 2001; Main et al., 2001; and Boyd et al., 2001 weighted according to the number of pens/treatment.
[b]1.02% lysine diet; 28.8-day feeding period.

addition, researchers have recently investigated the response of ractopamine in diets containing more than 16% crude protein and when it is fed for less time before slaughter than in previous trials. Therefore, we believe a re-evaluation of the economic feasibility of feeding ractopamine to finishing pigs is warranted.

Performance Results

Pig performance results were obtained from 4 abstracts given at the American Society of Animal Science meetings in 2001. Data from the 4 abstracts were combined to produce one data set for pigs fed 4.5 or 9.0 g/ton ractopamine (Tables 1 and 2). Means for each response variable were weighted according to the number of pens of pigs per treatment.

Total dietary lysine provided to pigs fed ractopamine ranged from 0.9 to 1.14%. The average level of lysine provided to pigs fed ractopamine was 1.03%. Slaughter weight for pigs fed ractopamine ranged from 245 to 288 lb. The duration of ractopamine feeding varied between 21 and 32 days before slaughter and all carcass data were collected at commercial slaughter plants. Fat-O-Meater® technology was used to collect carcass measurements on 80% of the pigs represented in Tables 1 and 2 while the AutoFOM® was used to access 20% of the pigs.

Daily gain and feed efficiency increased by 8 and 11 %, respectively, when pigs were fed diets containing 4.5 g/ton ractopamine (Table 1). Hot carcass weight for pigs fed 4.5 g/ton ractopamine was 2 lb heavier, yield (dressing percent) was unchanged, and lean percent was improved by 0.4% units compared to the control. Providing 9 g/ton ractopamine improved daily gain and feed efficiency by 11 and 14%, respectively (Table 2). Hot carcass weight was increased by 7 lb, yield by 1.1% units, and lean percent by 0.9% units. These observations support previous data showing that pigs fed 9.0 g/ton ractopamine perform better than those fed 4.5 g/ton.

Method for Estimating Value

Costs

Corn-soybean meal diets containing 0.72 and 1.03% lysine were formulated. We assumed a 0.72% lysine diet would be fed to finishing pigs provided no ractopamine; that allowed us to calculate the cost of additional amino acids provided to pigs fed ractopamine. Because ractopamine reduces feed intake and increases lean gain, dietary amino acid level should be increased. All the diets contained 44% crude protein soybean meal as the sole source of supplemental protein and the same level of energy, amino acids, vitamins and minerals. Diets were formulated to contain 0, 4.5 and 9.0 g/ton of ractopamine. Ractopamine ($28/lb of premix or $3.11/g of active ingredient) replaced corn in the diet. Corn and soybean meal were priced at $2.00/bu and $200/ton, respectively. Feed efficiency and daily gain would not be expected to improve by feeding a diet containing more than 0.72% lysine to finishing pigs used in the studies summarized for this report, thus all the additional ingredient expense for providing ractopamine fed pigs a higher lysine diet was assigned to them.

Some producers have reported a higher death loss among pigs fed ractopamine while they are transported to market. However, no transport deaths have been reported in the scientific literature. We included a transport death cost of $0.45/pig in our analysis, a figure estimated by researchers from Cape Fear Consulting in Warsaw, NC based on field trials where 4.5 and 9.0 g/ton ractopamine was evaluated.

Revenues

The responses for feed efficiency shown in Tables 1 and were applied to the diet containing ractopamine to estimate revenue from improved feed efficiency. The revenue realized from improved feed conversion was attributed to ractopamine. (Note: The control diet for calculating the revenue contained 0.72% lysine.)

We modeled two scenarios to estimate revenue from improved daily

gain by feeding ractopamine. In the first scenario we assumed pens would be "topped out" (TO) twice then the entire facility would be emptied. Therefore, pig slaughter weight would remain constant after ractopamine was introduced, except for pigs in the last shipment to market. They would weigh more when fed ractopamine, but we did not consider that in our analysis. Instead we assumed the faster growth rate due to feeding ractopamine would be manifest in fewer days to market. That could result in some savings in interest, utilities, and repair costs. This was credited at the rate of $0.05 per pig per day. The TO scenario is meant for producers who believe they are producing the heaviest market hogs their packer will accept given the time they have to feed them.

In the second scenario, we assumed pigs provided ractopamine were fed on a time constant basis (TC), i.e., they were fed for the same number of days before going to market as before ractopamine was introduced. Faster daily gain would be manifest in heavier pigs sold. The extra live weight sold was valued at $42/cwt. The TC scenario is meant for producers who are short on feeding days and can market heavier pigs without additional sort loss.

Revenue from increased carcass yield was calculated assuming a carcass price of $56.75/cwt of carcass.

Because of the large variation in genetics, production systems, and differences in packer buying grids and how carcasses are evaluated, it is difficult to develop estimates of the benefit a producer would receive in carcass lean premiums. The approach we have taken is presented in Tables 3 and 4. Costs and revenues for feeding ractopamine are itemized for feeding 4.5 (Table 3) and 9.0 g/ton ractopamine (Table 4) for TO and TC production scenarios. In the event that the additional costs exceeded the additional revenues, we calculated the amount of a carcass lean premium required to breakeven.

Table 3. Costs (-) and revenues (+) from feeding ractopamine (4.5 g/ton) in different production scenarios.[a]

	Top out		Time constant	
	$/pig		$/pig	
Item	Amount	Cumulative	Amount	Cumulative
Ractopamine	-1.17	-1.17	-1.26	-1.26
Extra amino acids	-1.44	-2.61	-1.44	-2.70
Transport deaths	-0.45	-3.06	-0.45	-3.15
Gain	+0.11	-2.95	+2.06	-1.09
Yield	+0.00	-2.95	+0.00	-1.09
Feed/gain	+1.17	-1.78	+0.42	-0.67
Required lean premium[b]	+1.78	0.00	+0.67	0.00
Net		0.00		0.00

[a]Top out = pens are topped out twice then facility emptied; Time constant = pigs are fed ractopamine for the same number of days before going to market as before it was introduced.
[b]Premium required to cover costs of feeding ractopamine after considering revenues from gain, carcass yield, and feed efficiency.

Table 4. Costs (-) and revenues (+) from feeding ractopamine (9.0 g/ton) in different production scenarios.[a]

	Top out		Time constant	
	$/pig		$/pig	
Item	Amount	Cumulative	Amount	Cumulative
Ractopamine	-2.30	-2.30	-2.54	-2.54
Extra amino acids	-1.47	-3.77	-1.47	-4.01
Transport deaths	-0.45	-4.22	-0.45	-4.46
Gain	+0.14	-4.08	+2.85	-1.61
Yield	+1.68	-2.40	+1.72	+0.11
Feed/gain	+1.54	-0.86	+0.53	+0.64
Required lean premium[b]	+0.86	0.00		0.00
Net		0.00		+0.64

[a]Top out = pens are topped out twice then facility emptied; Time constant = pigs are fed ractopamine for the same number of days before going to market as before it was introduced.
[b]Premium required to cover costs of feeding ractopamine after considering revenues from gain, carcass yield, and feed efficiency.

Results and Discussion

Feeding 4.5 g/ton ractopamine in a TO production scenario would require a carcass lean premium of $1.78/pig to breakeven (Table 3). In contrast, feeding 9.0 g/ton ractopamine in a TC production scenario did not require a carcass lean premium to breakeven (Table 4). Instead we projected a net profit of $0.64/pig; any lean premium earned would further increase net profit. Lean premiums were required to breakeven feeding 4.5 g/ton ractopamine in a TC production scenario ($0.67/pig) and 9.0 g/ton in a TO scenario ($0.86/pig). Our results indicate that a producer using a TO production scenario is more dependent on his/her pigs earning a lean premium than one who uses a TC scenario. In the TC scenario, the improvement in daily gain is valued more than it is in the TO scenario.

Considering that the method we used to calculate revenues from improved daily gain significantly affected the requirement for a lean premium, we also modeled the economics of feeding ractopamine at slaughter prices of $34 and $50/cwt (Figures 1 and 2). The amount of a lean premium required when feeding 4.5 g/ton ractopamine in a TO production scenario was not affected by slaughter price (Figure 1), because slaughter weight is constant and carcass yield was not affected by ractopamine. However, in a TC production situation, the amount of lean premium required to break even decreased as slaughter price increased. Feeding 9.0 g/ton ractopamine, resulted in a smaller lean premium required for the TO production scenario as slaughter price increased, because of increasing revenues from carcass yield. In contrast, no lean premium was required when feeding 9.0 g/ton ractopamine in

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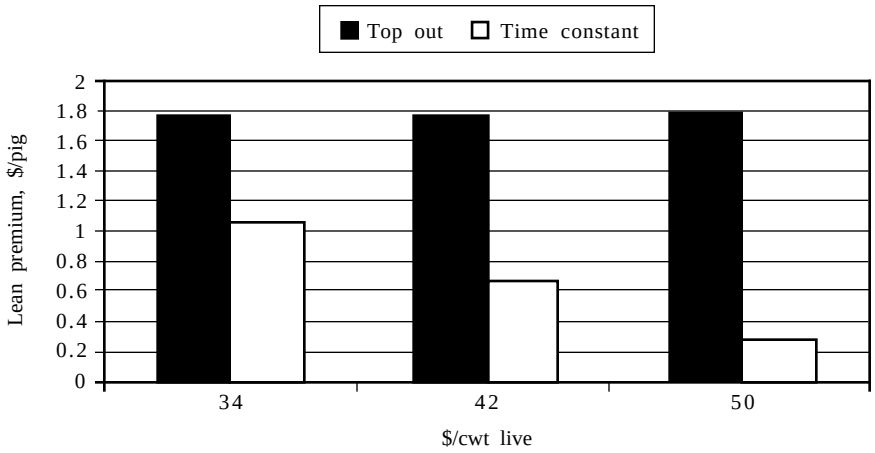

Figure 1. Estimated carcass lean premiums required to cover cost of feeding 4.5 g/ton ractopamine at various slaughter pig prices and production scenarios. Top out = pens are topped out twice then facility emptied; Time constant = pigs are fed ractopamine for the same number of days before going to market as before it was introduced.

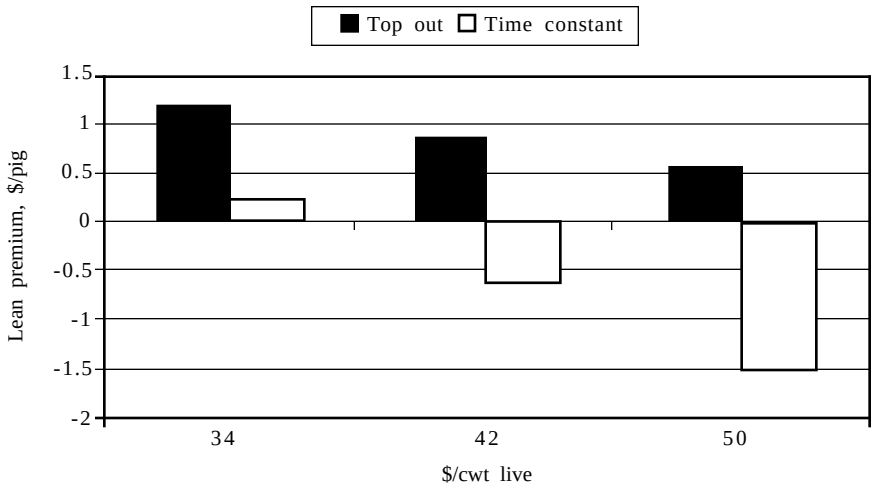

Figure 2. Estimated carcass lean premiums required to cover cost of feeding 9.0 g/ton ractopamine at various slaughter pig prices and production scenarios. Negative values indicate amount of potential profit, not including any lean premium that may be obtained, from feeding ractopamine. Top out = pens are topped out twice then facility emptied; Time constant = pigs are fed ractopamine for the same number of days before going to market as before it was introduced.

a TC production situation when live price was $42/cwt or more; our results indicate net earnings between $0.55 and $1.50/pig not including any lean premium that may be obtained.

If a producer considers it highly likely to obtain a larger average lean premium than that shown in Figures 1 and 2, it would be profitable to feed ractopamine. When considering possible premiums for carcass leanness, note that it is likely that not all carcasses from a group of pigs fed ractopamine will be shifted into a higher carcass pricing category and earn a lean premium. Thus, carcasses from pigs that earned a lean premium must pay for the ractopamine consumed by pigs that did not earn a premium.

The price of Paylean™ will also affect the size of the carcass lean premium needed per pig. For each $2/lb change in the price of Paylean™, the lean premium required changes by approximately $0.15, and $0.30 per pig for the 4.5 and 9.0 g/ton levels, respectively.

Summary and Conclusions

Ractopamine generally improves growth performance, carcass leanness and yield, especially at the 9 g/ton level. No lean premium was required to breakeven in 2/12 economic evaluations conducted. Lean premiums between $0.23 and $1.78/pig were required in 10/12 evaluations we conducted. In most of the situations we modeled, growth performance and carcass yield did not cover the costs of feeding ractopamine. In those situations, ractopamine must improve carcass traits that your packer is capable of measuring and paying for. If earning a carcass premium is in doubt, consider feeding 9g/ton ractopamine in a TC production scenario when slaughter price is greater than about $42/cwt.

Practical experience with feeding ractopamine in today's pork industry is increasing, but it is still limited. Therefore, it is important that producers calculate the costs and benefits of ractopamine for themselves and supplement that with published research data.

It may be very useful for producers to collect data from their own pigs fed ractopamine. One would obtain specific information from the packer which would help in deciding if the lean premiums we calculated are likely to be obtained. Also, you can determine how well you can effectively manage feeding ractopamine to achieve optimum results. For example, can you ensure the majority of pigs receive ractopamine for about 28 days before slaughter? In addition, can you ensure that pigs fed ractopamine will receive the extra care they need during handling and transport? Guidelines for conducting on-farm feed research trials are available in the University of Nebraska publication, *Conducting Pig Feed Trials on the Farm (EC 92-270)* available at county extension offices in Nebraska or on the Internet at http://www.ianr.unl.edu/pubs/swine/ec270.htm.

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