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EFFECTS OF WEANING AGE ON COSTS AND REVENUE IN THREE-SITE PRODUCTION

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Summary

Two trials were completed to determine the effects of weaning age on growing pig costs and revenue within a three-site production system. Cost and revenue were measured by applying operationally dependant information to trial data. Economic effects were determined assuming either limited or non-limited finishing capacity. In both trials and finishing capacity scenarios (limited or non-limited), income over costs and cost per hundredweight improved linearly as weaning age increased. In these studies, increasing weaning age up to 21.5 days resulted in linear increases in weaned pig value within a three-site production system. Assessing a common value to acceptable quality wean pigs regardless of weaning age or weight, may lead to false conclusions concerning a breeding herd's true financial performance.

(Key Words: Weaning age, Costs, Revenue, Economics.)

Introduction

Weaned pigs are commonly assigned an equal value within or between production operations, regardless of weaning age or weight. Although operations typically have individual pig quality criterion or discount programs, weaned pigs meeting the minimum standards are valued equally. Multi-site production has led sow farms to be independent financial entities. Depending on the scope of a production operation, the sow farm is either a cost or a profit center. Regardless of being a cost or profit center, sow farms typically value pigs or calculate cost information on a per weaned pig basis. Weaned pig production is the only segment of the production chain that does not have weight as the common denominator for cost information or in the matrix for revenue generation. These accepted standards for measuring cost and generating revenue operate under the premise that all wean pigs meeting a minimum standard are of equal value. These accepted means of accounting often encourage a reduction in weaning age. Sow farms can typically increase pigs weaned per week by increasing targets for litters farrowed. This weekly increase in litters subsequently causes weaning age to be reduced due to a fixed amount of lactation crates. Therefore, the objective of this research was to determine the effects of weaning age on growing pig costs and revenue. Two trials were completed to determine the effects of weaning age on pig performance within a three-site production system. The growth performance data from these trials was used to model economic implications of altering weaning age in applied three-site production.

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Procedures

Trial design, procedures and growth performance results are outlined in a preceding paper in this report. The paper is titled, "Effects of Weaning Age on Pig Performance in Three-Site Production." Cost and revenue information were applied to the growth performance data from these two prospective studies. The economic modeling is designed to allow for operationally specific cost and revenue information to be applied to trial data. The inputted cost and revenue information is being applied to trial data on a per finishing pen basis. (Trial 1 = 96 pens, 20 pigs per pen; Trial 2 = 120 pens, 25 pigs per pen). A standardized weaned pig cost and assumptions of an annualized $30 and $38 per pig space cost for nursery and finishing space were used (Table 1). Actual nursery-feed costs were used; however, since pen feed consumption was not measured in finishing, a common finishing feed cost per pound of gain was applied to all finishing weight gain. The miscellaneous per hundredweight cost is intended to allow for additional operationally specific costs, such as transport, supplies, vet-med, genetic royalties, and management fees. Additional assumptions were made for late-term finishing ADG, daily mortality rate, and a desired common market weight.

Cost and revenue information were calculated for both limited and non-limited finishing space scenarios. The limited finishing space analysis assumes restricted finishing capacity, and all age groups are sold after a fixed number of days post-weaning or in these analyses, off-test weigh day. Non-limiting finishing capacity allows all age groups to be grown to an equal average market weight. The information is presented on a per pig weaned and per head sold basis. Expressing performance and financial information on a per pig weaned basis enables all wean to finish throughput, cost, and revenue information to be brought back to a common denominator. This enables treatment differences in through-put and financial performance to be quantified in a manner that directly relates to value of the weaned pig and removes mortality-induced bias in traditional wean-to-finish close-out data analysis. In Trial 2, nursery feed budget complexity had no effect ($P{>}0.27$) on wean to finish growth performance. Therefore, only the main effects of weaning age are presented. Cost and revenue data were analyzed for linear and quadratic effects using finishing pen as the experimental unit in these analyses.

Results and Discussion

In Trial 1, feeder pig cost increased (quadratic, $P{<}0.01$, Table 2) as weaning age increased due to a linear increase in nursery feed intake with increasing weaning age. Only the 21-day weaned pigs had increased ($P{<}0.05$) feeder pig costs, as compared to other weaning age treatments. Quantitatively speaking, feeder pig costs were moderately flat as weaning age increased from 12 to 21 days due to the magnitude of mortality improvement observed with increasing weaning age. In both the limited and non-limited finishing capacity scenarios, revenue and income over costs per pig weaned increased (linear, $P{<}0.0001$, Tables 2 and 3.) and cost per hundred weight decreased (linear, $P{<}0.0001$) as weaning age increased from 12 to 21 days. Cost per head sold decreased (linear, $P{<}0.0001$) with weaning age, when all age groups can be marketed at an equal pig weight.

In Trial 2, feeder pig costs increased (linear, $P{<}0.0001$) as weaning age increased due to linearly improved nursery feed intake observed with increasing weaning age. In both the limited and non-limited finishing capacity scenarios, revenue and income over costs per pig weaned increased (linear, $P{<}0.0001$) and cost per hundred weight decreased (linear, $P{<}.0001$) as weaning age increased from 15.5 to 21.5 days. Cost per head sold decreased (linear, $P{<}0.0001$) with weaning age, when all age groups can be marketed at a equal pig weight.

In both studies, increasing weaning age increased (linear, $P<0.0001$) pounds sold per pig weaned due to improvements in growth and livability. Increasing pounds sold per pig weaned improved margins and production cost per hundredweight. These studies indicate that weaning age substantially affects the value of wean pigs within a given three-site production system.

Table 1. Assumptions Used to Model the Economic Effects of Weaning Age[a]

Input variable	Trial 1	Trial 2
Weaned pig cost, $	25	25
Nursery space ($ / space / day)	0.082	0.082
Nursery idle days / turn	5	5
SEW diet, $ / ton	0	450
Phase I diet, $ / ton	335	408
Phase II diet, $ / ton	237	263
Phase III diet, $/ton	172	194
Finisher space, $ / space / day	0.1041	0.1041
Miscellaneous costs (transport, meds & supplies, management fees, royalties, etc.), $ / CWT	5.00	5.00
Finisher idle days	7	7
Common finishing feed cost, $ / lb of gain	0.150	0.150
Net realized live price, $ / CWT	42.50	42.50
Late finishing (> 245 lbs) ADG, lb[b]	1.60	1.60
Late term finishing daily mortality[b], % per day	0.02%	0.02%
Non-limited grow-finish space, average market weight, lb[b]	265	265

[a]Operationally dependant cost and revenue assumptions were applied on two trials evaluating the effects of weaning age on growing pig costs and revenue.

[b]Assumptions of late-term finishing (>245 lb) ADG and daily mortality rate (Consistent with trial data, as trial groups were sold in June - August.), as well as desired average market weight are needed to model effects of weaning age in production operations non-limited in grow-finish capacity, enabling all treatments to be grown to a common average pig weight.

Table 2. Influence of Weaning Age on Cost and Revenue with Limited Finishing Space[a,b]

| | Trial 1 | | | | | | | Trial 2 | | | | | |
| | Weaning Age | | | | | Probability (P<) | | Weaning Age | | | | Probability (P<) | |
Item	12	15	18	21	SE	Linear	Quadratic	15.5	18.5	21.5	SE	Linear	Quadratic
Allottment weight, lb[c]	7.5	9.4	10.8	12.7	0.11	0.0001	0.68	8.98	10.54	12.44	0.21	0.0001	0.001
Off-test weight, lb[d]	229.0	240.6	247.0	258.7	1.79	0.0001	0.94	247.0	254.8	262.8	2.83	0.0001	0.91
Pounds sold / pig weaned, lb[e]	207.5	221.6	230.3	249.3	2.89	0.0001	0.35	237.2	246.1	256.2	2.36	0.0001	0.56
Feeder pig cost, $[f]	34.66	34.47	34.63	34.80	0.12	0.05	0.008	35.58	35.91	36.29	0.14	0.0001	0.65
Cost/CWT sold, $	39.10	37.76	36.96	35.54	0.21	0.0001	0.84	36.65	35.95	35.15	0.15	0.0001	0.66
Cost per head sold, $	89.52	90.82	91.27	91.94	0.56	0.003	0.57	90.5	91.55	92.34	0.72	0.0001	0.69
Revenue per pig weaned	88.17	94.19	97.86	105.94	1.23	0.0001	0.35	100.80	104.57	108.89	1.00	0.0001	0.70
Costs per pig weaned	80.98	83.54	84.98	88.52	0.65	0.0001	0.34	86.88	88.38	90.02	0.50	0.0001	0.85
Income over variable costs per pig weaned	7.19	10.65	12.88	17.42	0.60	0.0001	0.35	13.92	16.19	18.86	0.52	0.0001	0.56

[a]Wean-to-finish cost and revenue data from two trials (Trial 1 = 96 finishing pens with 20 pigs/pen, and Trial 2 = 120 finishing pens with 25 pigs/pen) evaluating effects of weaning age in production operations with limited finishing space.

[b]Limited finishing space is defined as having a fixed number of finishing spaces available. Therefore, analysis assumes all age groups have to be sold on a fixed number of days post-weaning, or off-test weight day in this analysis.

[c]Allottment weight is the average pig weight attained 3-days prior to weaning.

[d]Off-test weight is the average pig weight at 156 and 153 days post-weaning for Trials 1 and 2, respectively.

[e]Pounds sold/pig weaned = Off-test pen weight/number of weaned pigs required to place finishing pen.

[f]Feeder pig cost = Weaned pig cost + all nursery costs.

Table 3. Influence of Weaning Age on Cost and Revenue with Non-Limiting Finishing Space[a,b]

| | Trial 1 | | | | | | | Trial 2 | | | | | |
| | Weaning Age | | | | | Probability (*P<*) | | Weaning Age | | | | Probability (*P<*) | |
Item	12	15	18	21	SE	Linear	Quadratic	15.5	18.5	21.5	SE	Linear	Quadratic
Allottment weight, lb[c]	7.5	9.4	10.8	12.7	0.11	0.0001	0.68	8.98	10.54	12.44	0.21	0.0001	0.001
Sale weight, lb	265	265	265	265	.	.	.	265	265	265	.	.	.
Pounds sold / pig weaned, lb[d]	240.1	244.1	246.9	255.3	2.52	0.0001	0.39	254.59	255.90	258.41	1.37	0.0284	0.67
Wean-finish days to a common market weight, d	134	129	125	118	1.17	0.0001	0.94	123	118	113	1.33	0.0001	0.91
Cost per CWT sold, $	37.41	36.75	36.27	35.33	0.20	0.0001	0.43	35.96	35.58	35.07	0.08	0.0001	0.50
Cost / head sold, $	99.14	97.39	96.15	93.63	0.46	0.0001	0.43	95.30	94.29	92.93	0.21	0.0001	0.50
Revenue per pig weaned, $	102.03	103.73	104.95	108.52	1.07	0.0001	0.39	108.20	108.76	109.83	0.59	0.0284	0.67
Costs per pig weaned, $	89.72	89.57	89.46	90.14	0.54	0.63	0.44	91.51	91.01	90.61	0.42	0.0168	0.88
Income over costs per pig weaned, $	12.31	14.16	15.49	18.38	0.56	0.0001	0.35	16.69	17.75	19.22	0.26	0.0001	0.53

[a]Wean-to-finish cost and revenue data from two trials (Trial 1 = 96 finishing pens with 20 pigs/pen; Trial 2 = 120 finishing pens with 25 pigs/pen) evaluating effects of weaning age in production operations with non-limiting finishing space.

[b]Non-limiting finishing space is defined as having an unlimited number of finishing spaces available. Therefore, all age groups can be grown to an equal weight.

[c]Allottment weight is the average pig weight attained 3-days prior to weaning.

[d]Pounds sold/pig weaned = Off-test pen weight/number of wean pigs required to place finishing pen.