

Sow indexes should be computed on a within contemporary group basis. Table 6 shows the effect of season on sow productivity. Seasons are broken down in 3-month groups starting with March-May as season 1.

Table 6 Overall

Season	No.	Total Born	Born Alive	No. After Transfer	No. Weaned	Adj. Weaning Wt.	Ave. Wt. Per Pig	SPI
1	2700	11.23	10.46	9.92	8.70	122.3	12.8	190.4
2	2859	11.18	10.34	9.84	8.43	117.7	12.3	184.9
3	2085	11.03	10.24	9.73	8.40	119.6	12.6	186.1
4	3415	11.19	10.37	9.82	8.54	122.4	12.9	189.8
F Test		NS	NS	**	**	**	**	**

A decline in sow productivity occurs during the summer months, possibly due to the effects of temperature.

The above results give preliminary data from analysis of over 11,000 sow records. The complete data will soon be available in published form. The refinement in the adjustment factors as given will improve the accuracy of sow indexing to more accurately estimate genetic differences.

ECONOMICS OF COMMERCIAL SOW PRODUCTIVITY

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As building costs escalate and production systems become more intensified, swine producers become more concerned about sow productivity. The American swine producer reads and is told by his extension specialist, feed salesman, breeding stock supplier and others that he is woefully behind European producers in measurer of sow productivity. Furthermore, they tell him that he must improve if he is to compete as an American producer and afford modern technology.

Many production variables are used to describe measures of sow productivity. For years producers have used litter size farrowed and weaned to establish bragging rights at the local coffee shop. More recently, litters farrowed per female per year has entered into the discussion. Certainly any expression based on female year requires a clarification of when gilts enter the breeding herd inventory. Americans normally include gilts in the breeding herd inventory when they are diverted from market channels. Most Europeans add gilts to the breeding inventory when they are first bred. This discrepancy in inventory procedure causes American values to be about 10% less than corresponding European values.

Perhaps the most universally quoted measure of sow productivity today is pigs weaned per female year. This value is nothing more than average litter size weaned multiplied by average litters farrowed per female year. This value now includes sow productivity factors such as sow and boar fertility and sow attrition from non-reproductive causes. I would like to introduce another term, "pounds of pork produced per female year", because the tonnage of pork sold per farm ultimately determines gross income for the swine enterprise.

The balance of this paper will comprise an analysis of economic and production data from Kentucky swine farms participating in a detailed study to determine the costs and returns to the swine enterprise. These farmers are members of the Kentucky Farm Business Analysis Association. Records have been obtained for the years 1976 through 1981; however, for this paper, I have only analyzed records from 1979, 1980, and 1981. The data expressed by year is shown in Table 1. As you can see, the negative net returns of 1979 and 1980 took their toll on farms participating in the study. Seventeen farms participated in the study all three years, 26 were 2-year participants, and 31 farms only had 1 year's record in 3 years analyzed.

Total production costs increased significantly during this period and peaked in 1981 at \$49.98 per 100 lbs. of pork produced. Total returns failed to cover production costs in each of the 3 years, and the loss averaged \$7.39 per 100 lbs. produced. The effect of year on net return was also significant at the .01% level. Yearly averages for several production variables related to sow productivity are also shown in Table 1 and did not exhibit any statistically significant year to year variation. As one might expect, considerable variation was present in the data; however, the averages are consistent with data from previous years and from other states.

Since both total cost and net return were significantly different by year of data collection, the data were evaluated within year to determine the impact of various sow production variables on total cost and net return. Each year's data was divided into three equal sized groups (Low, Medium and High) by the number of pigs weaned per female year. The yearly means for other variables were then calculated and averaged across year to arrive at the values presented in Table 2. Pigs weaned per female year averaged 9.23, 12.77 and 15.80 for the low, medium, and high sow productivity groups.

As you can see from Table 2, all variables studied were significantly affected by sow productivity grouping. Increasing the number of pigs weaned per female year resulted in lower production costs and higher net returns. The high sow productivity group farrowed and weaned more pigs per litter, farrowed more litters and pigs per female year, and produced more pounds of pork per litter and per female year. Furthermore, pre- and postweaning death loss was reduced with increasing sow productivity. These data indicate that improving sow productivity is economically rewarding to the swine producer.

The sow productivity variables detailed in Table 2 were submitted to regression analysis to determine their impact on the within year

variation in total cost and net return. Approximately 45 to 55% of the within year variability in total cost and net return can be accounted for when all of the aforementioned variables are included in the model. Pounds of pork produced per female year appeared to be the most sensitive single variable and accounted for about 30-35% of the within year variation in total cost and net return.

Estimates of the economic value of differences in sow productivity are given in Table 3. These estimates were calculated from the previously discussed regression equations. If a producer improves his productivity by 100 lbs. of pork produced per female year, he could expect to reduce his production costs by \$.61 per hundred pounds produced and increase his net returns by \$.65 per cwt. If he measures his productivity in pigs weaned per female year, he could expect to reduce costs by \$1.35 and increase net returns by \$1.44 per hundred pounds of pork produced for an improvement of 1 pig weaned per female year. On a farm with 100 sows producing 280,000 lbs. of pork annually, the reduction in costs and increase in net returns would be \$1,708 and \$1,820 for each increase of 100 lbs. of pork produced per female year or \$3,780 and \$4,032 for an increase of 1 pig weaned per female year.

In conclusion, these data indicate that improving sow productivity is economically rewarding to the swine producer and is worthy of increased attention.

Table 1. Average Costs and Returns of Kentucky Farrow-to-Finish Enterprises with Production Variables, 1979-1981.

	1979	1980	1981	Avg.
No. farms	50	49	35	44.7
Litters farrow/farm	182.4	209.4	238.0	209.9
No. sows/farm	113.5	121.4	131.5	122.1
Per 100 lb pork produced:				
Total cost	\$42.82	\$45.93	\$49.98	\$46.24**
Net returns	\$-7.14	\$-6.52	\$-8.52	\$-7.39**
Pigs far/litter	9.4	9.4	9.8	9.5
Pigs weaned/litter	7.2	7.4	7.7	7.4
Pounds prod/litter	1645	1609	1665	1640
Lit. far/FeYr	1.61	1.69	1.74	1.68
Pigs far/FeYr	15.1	16.0	17.2	16.0
Pigs wean/FeYr	11.6	12.5	13.4	12.5
Pork prod/FeYr, lb	2648	2719	2897	2755
Death loss				
Prewaning, %	23.1	22.0	21.4	22.2
% pigs weaned	8.51	6.69	5.52	6.92
% pork prod	3.84	2.18	1.85	2.63

* P < .05

** P < .01

Table 2 Average Costs and Returns of Kentucky Farrow-to-Finish Enterprises with Production Variables, 1979-1981

	Sow Productivity Group		
	Low	Medium	High
No. sows/farm	91.6	150.2	123.4
Litters far/farm	133.8	259.9	236.3
Per 100 lb of pork produced:			
Total cost	\$ 49.33	\$46.84	\$42.34**
Net returns	\$-11.62	\$-7.60	\$-2.72**
Pig far/litter	8.83	9.70	10.08**
Pig wean/litter	6.45	7.43	8.36**
Pounds pork/litter	1502	1611	1816 **
Avg. selling wt.	228	221	219 *
Litters far/FeYr	1.43	1.73	1.89**
Pig far/FeYr	12.67	16.72	19.08**
Pig wean/FeYr	9.23	12.77	15.80**
Pork prod/FeYr	2144	2776	3430 **
Death loss			
Prewaning, %	26.5	23.1	16.6 **
% pigs weaned	8.61	6.44	5.68**
% pounds prod.	3.94	2.06	1.75**

* P < .05.

** P < .01.

Table 3. Estimate of Economic Value of Sow Productivity Differences

	100 lb Pork Prod/FeYr	1-Pig Wean/ FeYr
Per 100 lb pork produced on the farm:		
Total cost	\$.61	\$1.35
Net returns	\$.65	\$1.44
100 sows producing 280,000 lb of pork		
Total cost	\$1,708	\$3,780
Net returns	\$1,820	\$4,032