USING SPACE AGE TECHNOLOGY IN SELECTION FOR SOW PRODUCTIVITY

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As background for my presentation, I would like to tell you quickly about a bit about our operation. We operate a 450-sow, three breed herd in confinement. We have grown into this operation over a period of 27 years, beginning with two Hamp sows. Today, we are one of the largest suppliers of individually tested seedstock.

The data which I will be discussing with you today encompasses some 20,000 progeny from 55 sires and 93 sow families. We have been collecting these gigantic masses of detailed data for 14 years, but only in the last few years have we been able to extract from it the kind of facts you will see here.

In gathering the raw data, most of our tools and techniques are readily available to most breeders if they will only take the time and effort to use them. These include the small hog scale for determining average daily gain, feed efficiency, days/230#, 21-day litter weights, etc. Another tool used daily is our electronic scale for weighing feed into feeders. Every boar and gilt is sonorayed to determine backfat, percent lean cuts, and square inches of loin eye. We use a pregnosticator on each sow to be sure she is pregnant. Then we go two steps further than most producers do by putting the data we collect into computers, then analyzing the printouts instead of the raw data.

Some might say, "Why go to so much effort to produce a pig?" or, "We can sell all the breeding stock we can produce without doing all that testing. Why should we spend all the unnecessary money and time?" My answer to these people is, "Sure, it is work and it is very costly. But, if you are really serious about improving seedstock, as I am, you <u>must</u> use every <u>kind</u> of modern technology that can be developed to soundly test, evaluate, and select the most profitable animals for propagation. Nothing less will suffice, or someone will replace <u>both</u> your product and you!"

As you have probably surmised by now, we are interested in improving every facet of the seedstock population. We stress different traits in each breed, but strive to keep balance in our efforts. In my estimation, such costly defects as hernias, hermaphrodites, ridglings, cryptorchids, diverted or tied penis', small vulvas, lack of libido in boars, ability to settle in sows, and blind or inverted teats must be eliminated regardless of how good the animals are otherwise. Therefore, we discard all dams who transmit these inherent problems as well as their progeny. Sires who transmit these traits at levels above the average for other sires in the herd are also disposed of <u>regardless</u> of value or records achieved. This is our first criteria for selection.

Our second criteria is to identify structural soundness problems that are judged to be economically distressing. Seedstock propagating these problems are also released from service.

After these two criteria have been fulfilled, we then have two more criteria of selection. These two vary in importance between and within breeds according to what we wish to accomplish. One is individual feedlot performance data on the individual as well as that of the parents and sibs, including ADG, Days to 230, FE, BF, LEA and % LC. The other is the SPI ranking of the dam, sire, sire of dam, and sow family.

Finally, there is one more selection phase - visual appraisal for type. This is one radical difference between our selection procedure and most - as most producers have this as their first priority in selection. However, in spite of the fact that I and my employees are good evaluators (if you will) of the parts of the pig - that is, which is the longest, flattest-muscled, loosest, or whatever, we don't really know what we should be looking for. And furthermore, as evidenced by recent trends, I'm not sure anyone else does. Therefore, if, after finding animals that will meet all of our specifications up to visual appraisal, we still find we have more than we need, we will get brave and say, "Ok, I don't like the type of that one -- she is not a keeper." Perhaps we are wrong, hopefully we are right. Only time will tell.

This brings me to the real meat and potatoes of my presentation. You have seen that we are putting a great deal of emphasis on the sow productivity index. Let's take a closer look at the data collection, formulation, analysis, and application of such a sophisticated technical evaluation tool as SPI.

First of all, let's consider data collection. Facts that need to be submitted to the computer are:

1. Litter ID
2. Sow ID
3. The sow family
4. Sire of the Sow
5. Breed of the dam
6. Breed of the sire
7. Parity (how many litters the sow has had)
8. Number of pigs born - total and alive
9. Number after transfer (litters should be standardized)
10. Number and weight of pigs at 16-26 days
    (We weigh each Tuesday)
11. Farrowing date

Data other than this, such as speed of farrowing, ease of farrowing, birth weight, sow pen habits, sow disposition, etc., is not necessary as this type of data only indicates the causes for the SPI being what it is. We do record this type of information as further detail, but it is not necessary.

Given this raw data, our computer at OSU is capable of adjusting for several factors so as to make all data comparable. Such as:

1. Breed of dam -- We all know (even if some breeds don't want to admit it) that there are vast differences between breeds. We'll take a very close look at this a little later.

2. Parity -- We also know that gilts generally have smaller and lighter litters than sows. The computer has been programmed for this and compensates accordingly so that gilts can be compared on an equal basis. It is also programmed to give slightly more value to the SPI as

more litters of history are accumulated. The more litters a sow has contributing to the index, the more valuable it is considered to be.

3. Contemporary grouping -- All sows that are put through at one time are considered a contemporary group, and each individual is compared only to the others within that group. This removes such variables as seasonal weather influences, TGE, scouring, cornfielditis, etc.

After these adjustments to the raw data supplied, the computer then segregates the following information:

1. It ranks, in order of Breeding Value, or SPI, all the sows submitted in the last contemporary group by breed. Beside the SPI it also lists the farrowing interval since the last litter. It reprints the raw data on this page, also.

2. The summary section gives the average of litter size, farrowing interval, and litters/sow/year on this group.

3. The overall sow rankings section ranks within each breed every sow upon which a record has ever been computed.

4. The sow family summary then within each breed ranks the sow families of which it is composed.

5. The Sire of Sow summary does the same for each sire of sow.

Now I would like to report some studies that we have made on data from our herd and relate it to this type of program. In a study of 574 litters we examined the influence of parity on 21-day weights. The results are presented graphically on figure 1, showing an increase of 10 pounds between a gilt and a first-litter sow, a slight increase in the two succeeding litters, then a drop in production.

In an early study made only in regard to pigs farrowed and pigs weaned per sow in each of the three breeds, we compared purebred litters to crossbred litters obtained by simply crossing two purebred parents. This study involved 1072 litters and covered two years.

The results are reported in figures 2 and 3. The first year we had a mean parity of 1.5 (½ first litter sows, ½ gilts). The second year we had a parity of about 3.0. Basically, what I want to point out here is that all three breeds respond very favorably in response to breeding to a purebred boar of another breed in terms of both pigs farrowed and pigs weaned. There is also an indication that York gilts may not benefit by crossing. There was another factor pointed out in this study indicating that there were significantly more pigs attributed to still-birth in purebred litters (about .1 in Hamps and Durocs, about .5 in Yorks).

I have also graphically summarized the SPI variance by breed and within each breed by individual (figure 8) and by sire of dam (figure 9). Each graph shows the high and low extremes as well as the median. The most pronounced difference is between the purebred dams and the crossbred dams. The poorest crossbreds perform at about the level of the median of the purebreds and tend to be much more uniform.

In analyzing this study, I felt that the sire of the litter had a bearing upon the 21-day weight. However, university research had not substantiated this, so there is nothing built into our computer program to compensate for the influence of the sire upon SPI. I, as well as most experienced hog men have debated this issue with the researchers many times. I have evidence which could be put into a study which I am sure would show differences between sires of the same breed upon the 21-day weights. This has not been studied thoroughly. We have been fortunate to recently have been able to segregate all of our computer data into purebred litters and crossbred litters. Here, in graphic form, are the exciting summaries of all this work in figures 4, 5, 6, and 7. I think it is extremely evident that the breed of the sire of the litter has greatly influenced the SPI of the sow families in every breed, and in (probably) every sow family. This discovery significantly distorts the accuracy of our SPI formula Therefore, we will probably need to do further study on this to determine exactly how much and in what way the sire of the litter influence should be compensated for. This discovery simply points out that computer programs are wonderful when properly formulated. These formulas must be based on latest research available. As we get deeper into our investigations and applications of such programs, we may discover to our sheer amazement that sow productivity has always been perhaps 25-30% heritable - not 5-10% as we used to think - not 15-20% as we now believe with the selection formula developed by Ohio researchers. Could the key be only discovery and proper application of all the factors influencing conception, gestation, farrowing, and lactation? It's exciting to think about the possibilities.

Another factor not compensated for by the computer, but reported beside the SPI (as I mentioned earlier), is farrowing interval. I am extremely happy to see it reported, as I feel that it is really one very crucial factor in the determination of profitability of the swine enterprize. We do not disregard it as we study our monthly printouts. I feel there is a possibility for improvement of OSU's formula by including an adjustment factor (plus or minus) for length of farrowing interval. As I have stated before in various articles, the ultimate measure of a sow's productivity should include, along with the number born, number at 21 days, and weight at 21 days, the days required to produce that weight. I feel that an excellent commercial herd should produce 1# of 21 day-old pigs/day/sow (including gilts starting at 7½ months or breeding age). This would be accomplished by having large litters from good milking sows that settle when they are supposed to. If any one of these three factors are lacking, production falls. Therefore, I again emphasize the often overlooked, and even more often ignored, factor of farrowing interval.

In conclusion, let me compliment the Ohio specialists who put our program together. They have done a fine job and will continue to improve the program as new discoveries are made. I am sure that the only thing that will prevent the industry from making rapid strides in sow productivity will be the reluctance of swine breeders to pursue space age technology in their operations. The computer program outlined here is the newest and most reliable tool available and should be used _with_ sonoray, scales, pregnosticators, etc. to develop the productive hog of the future, just as space scientists are using computers _with_ other technologies to build better spaceships. Let's make the hog of the future productive in the farrowing house, fast and efficient in the feedlot, and a savory treat for the consumer.

Figure 1.

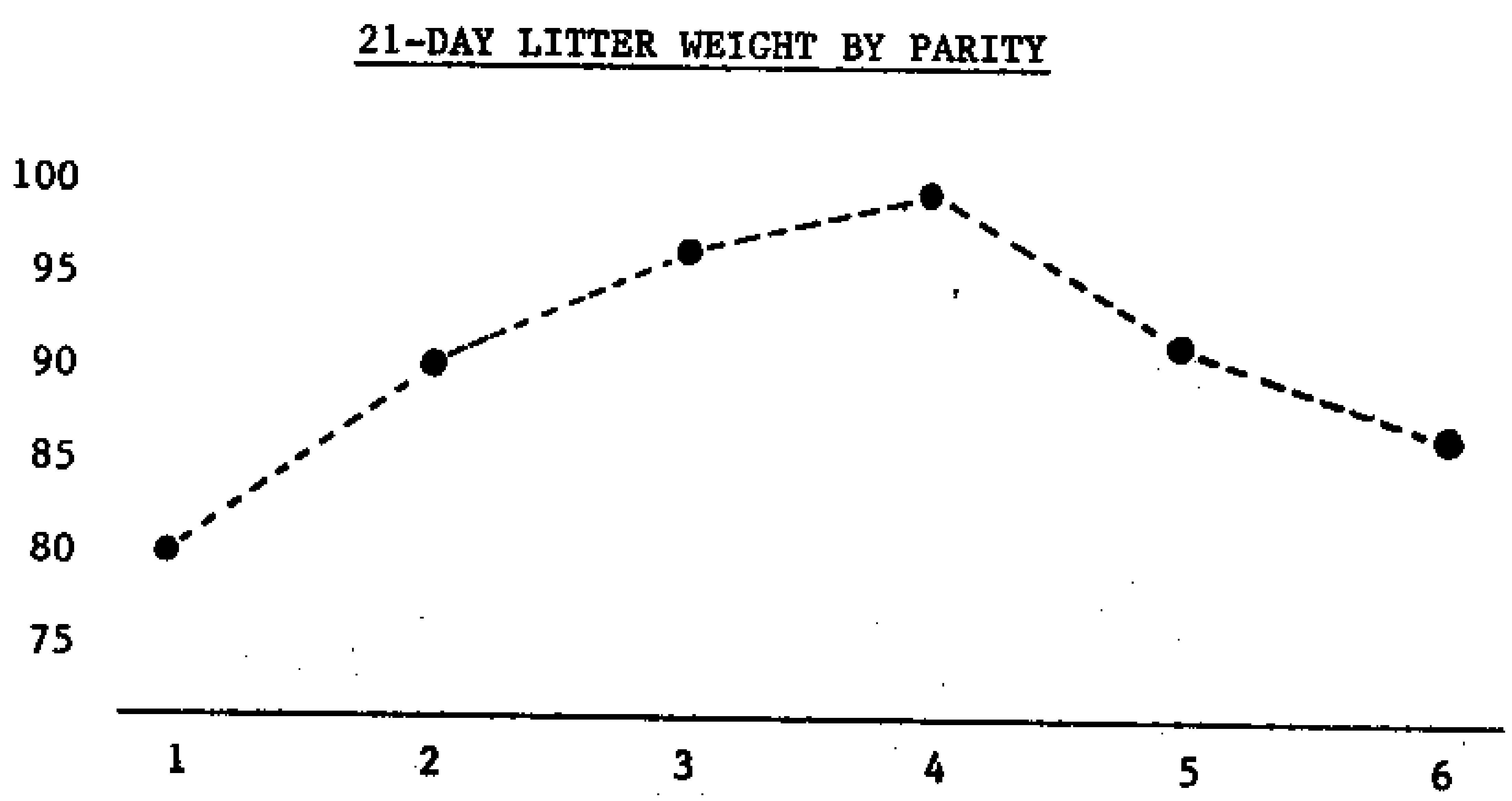

Figure 2.

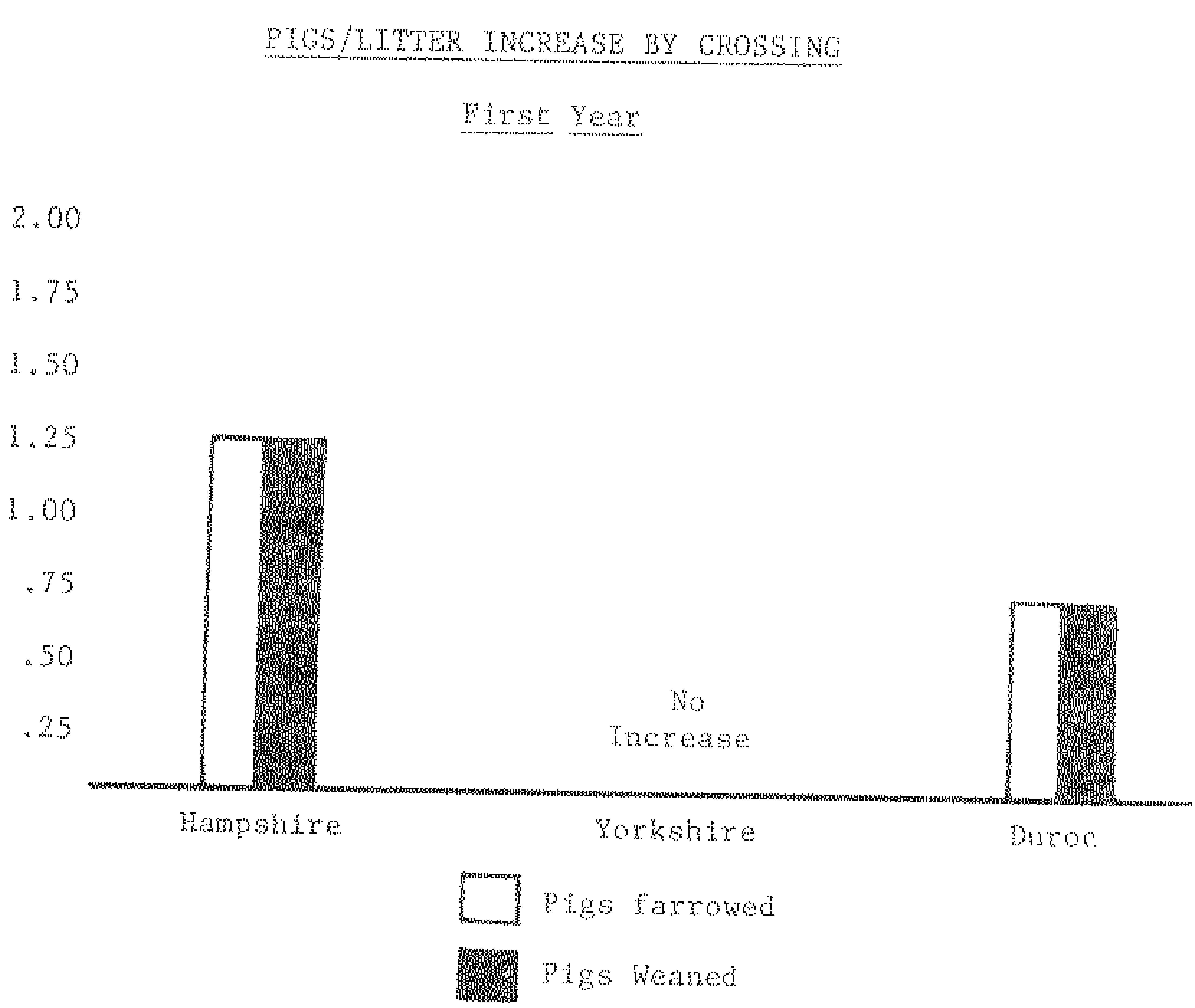

Figure 3.

PIGS/LITTER INCREASE BY CROSSING

Second Years

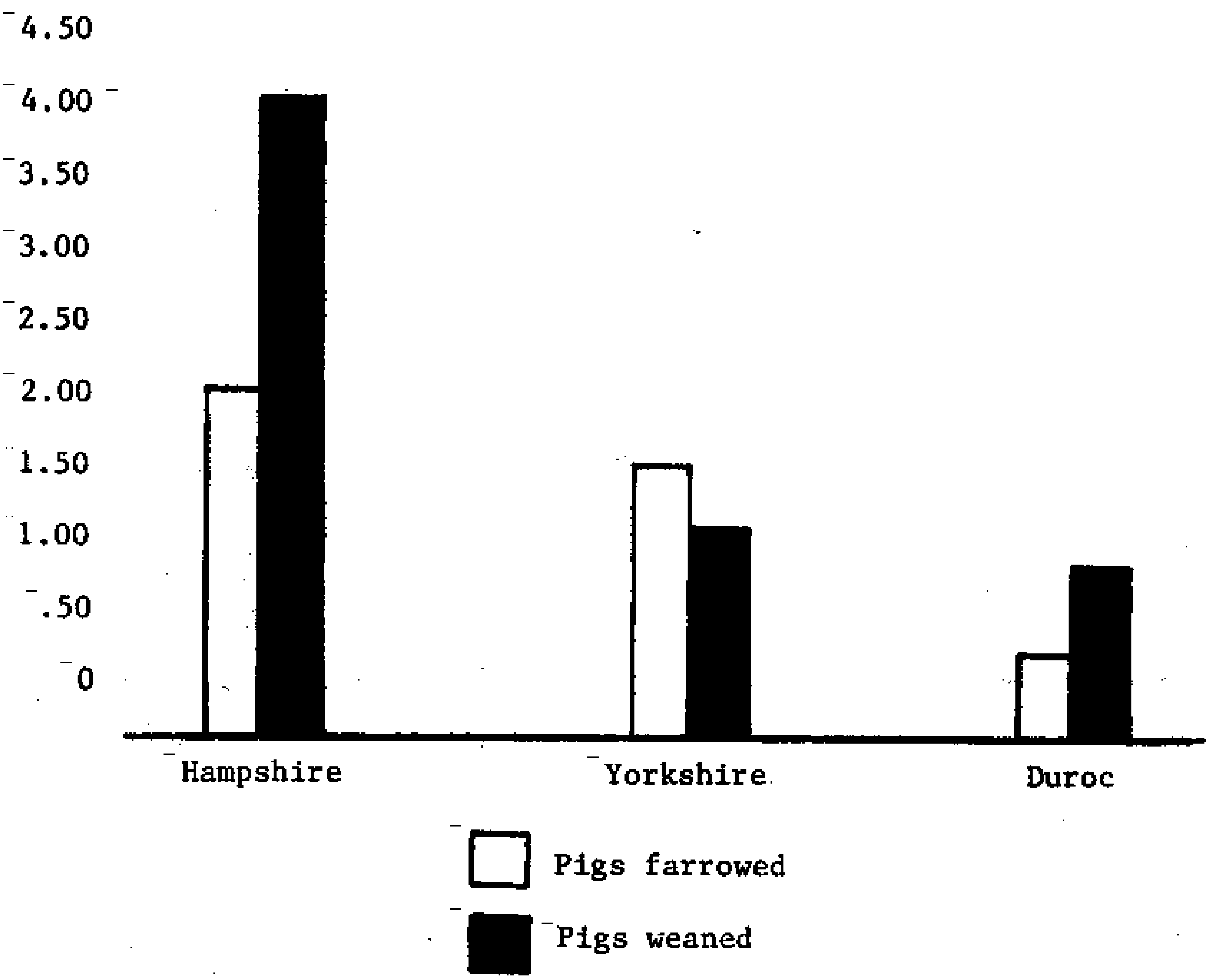

Figure 4.

YORKSHIRE SOW FAMILIES - SPI CROSSBREEDING COMPARISON

Sows	Family	Cross-bred SPI
34	F	103.03
64	E	101.86
11 (1 pure)	D	101.40
39	C	101.34
3	B	100.45
9 (2 cross)	A	98.87
160 Weighted Mean		

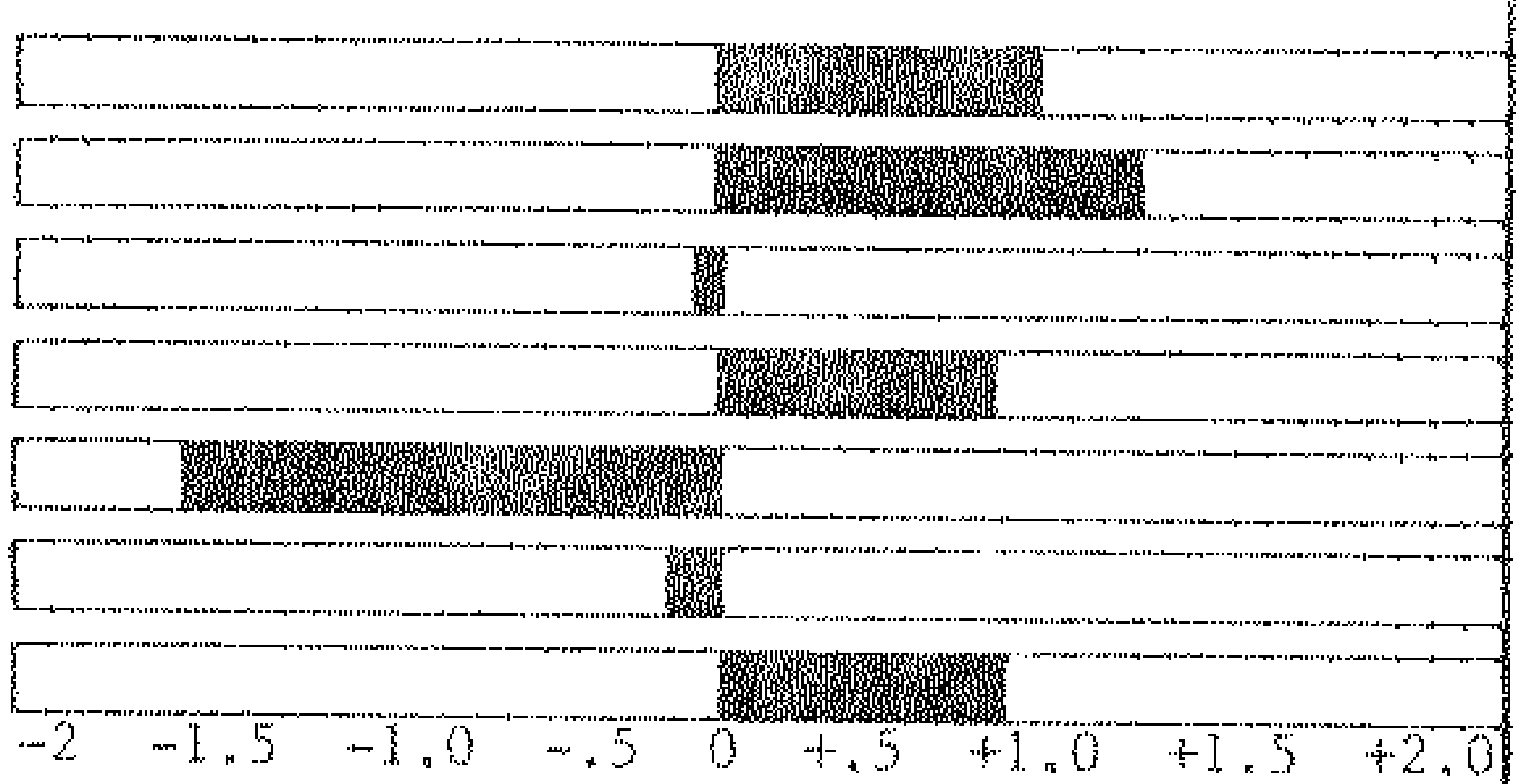

Figure 5.

DUROC SOW FAMILIES - SPI CROSSBREEDING COMPARISON

Sows	Family	Crossbred SPI
3	N	104.15
5	M	102.10
13	L	101.87
5	K	101.80
19	J	101.67
7	I	100.85
8	H	100.60
19	G	100.13
11	F	99.65
5	E	99.0
5	D	98.1
8	C	96.8
2	B	96.4
6	A	96.2
116 Weighted Mean		

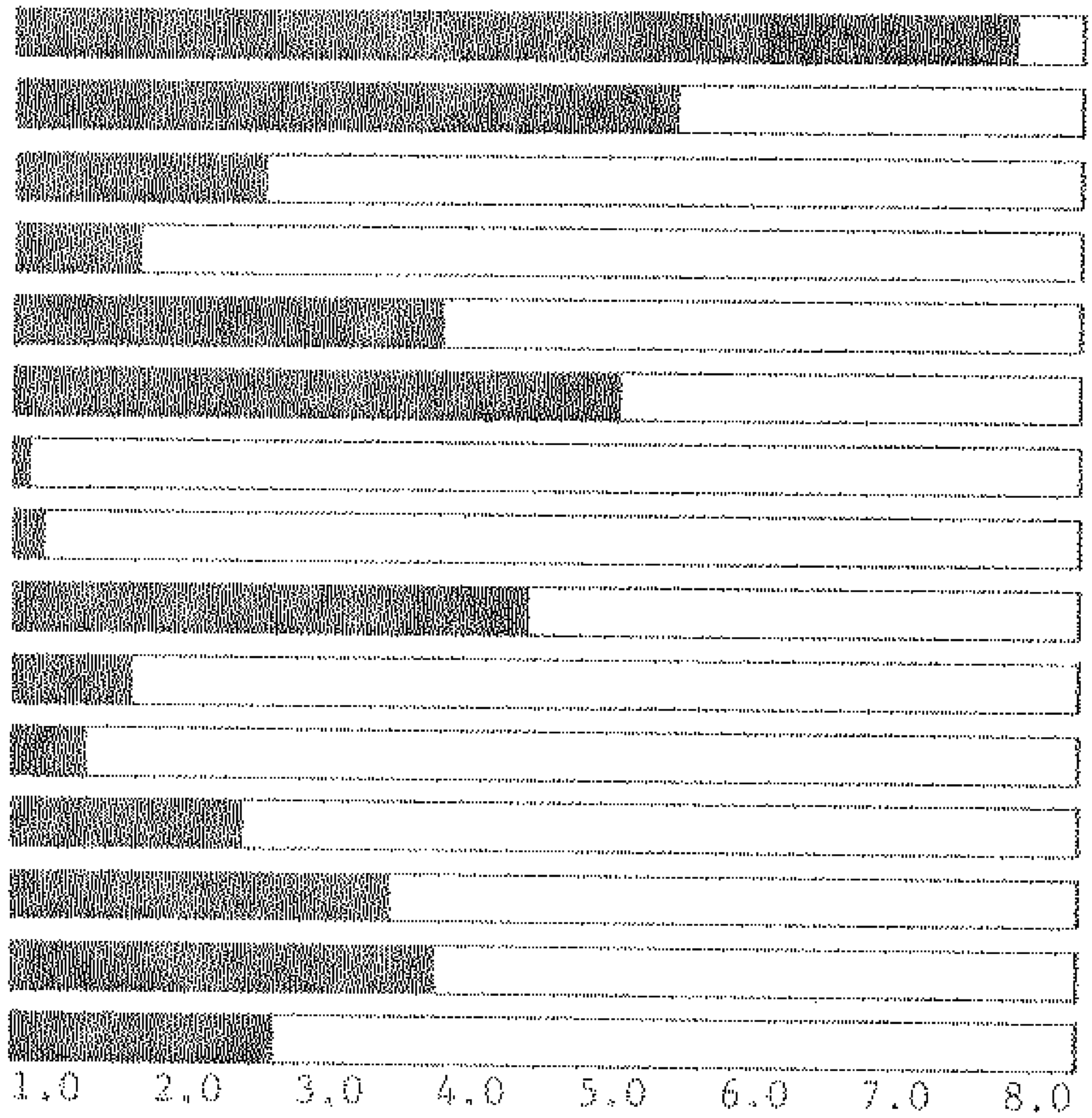

Figure 6.

HAMPSHIRE SOW FAMILIES - SPI CROSSBREEDING COMPARISON

Sows	Family	Crossbred SPI
4	D	102.8
11	C	102.23
29	B	101.25
4	A	101.00
48 Weighted Mean		

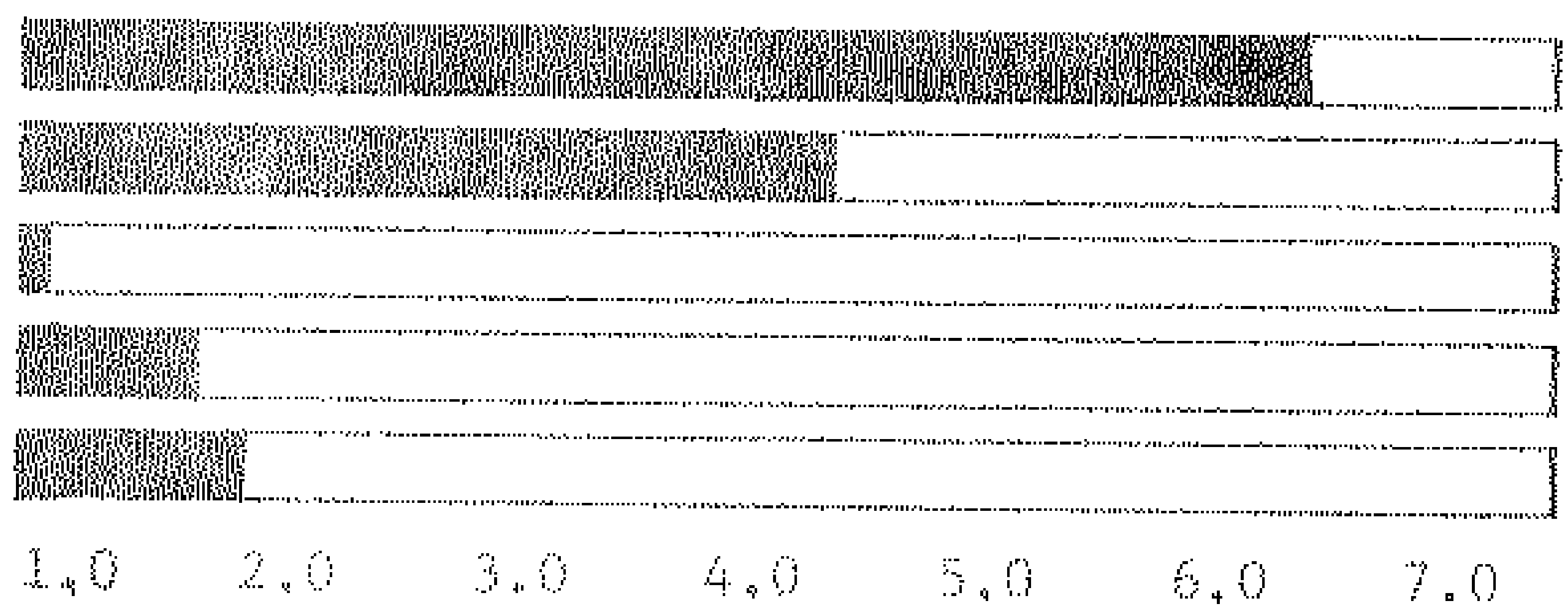

Figure 7.

BREED MEAN SPI - CROSSBREEDING COMPARISON

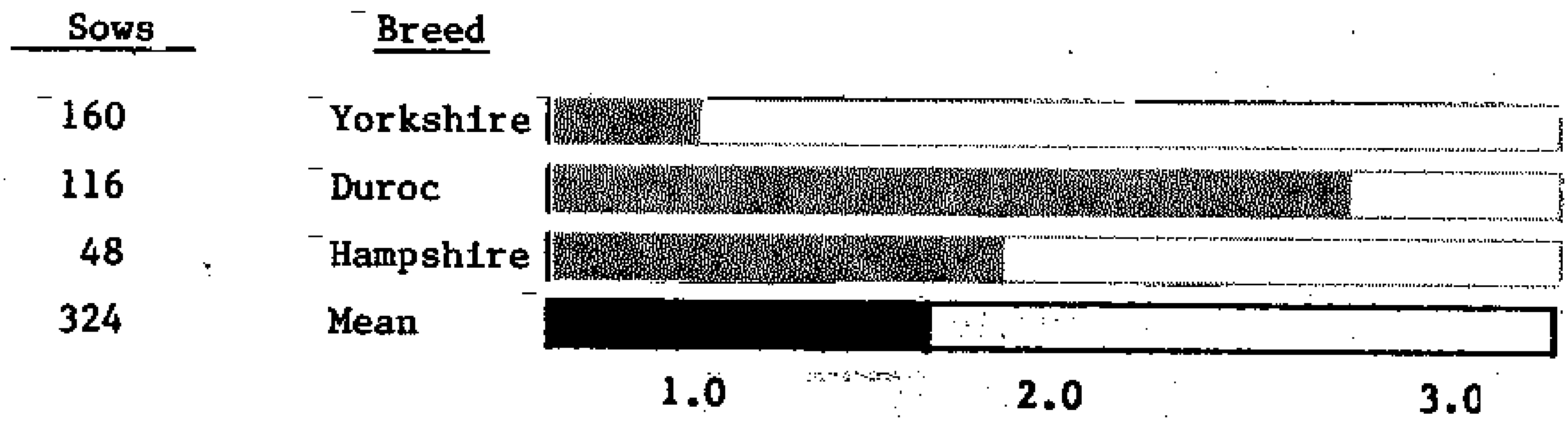

Figure 8.

INDIVIDUAL SPI VARIANCE BY BREED AND WITHIN BREEDS

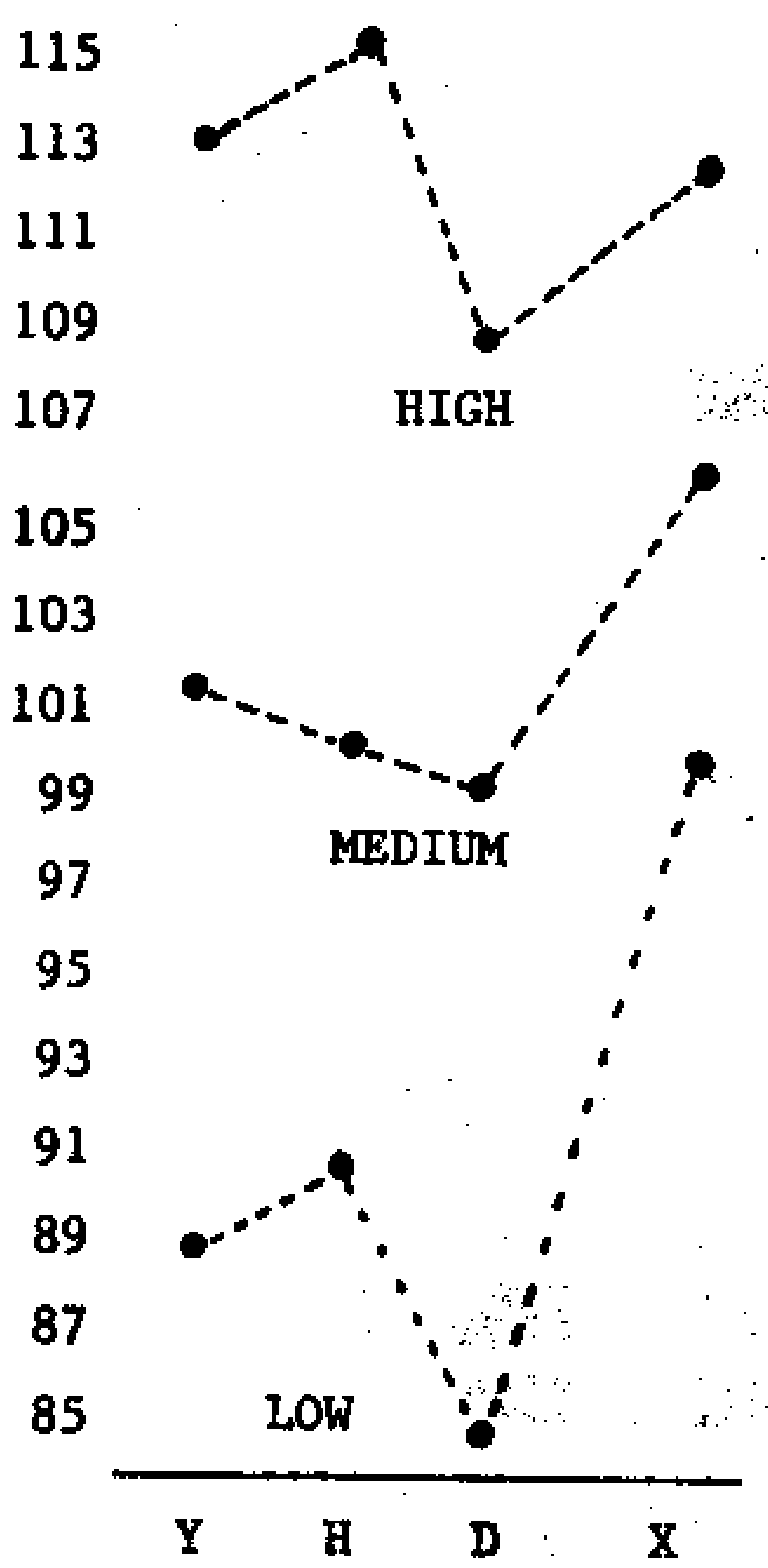

Figure 9.

SIRE OF DAM SPI VARIANCE BY BREED AND WITHIN BREEDS