Worldwide importance of numbers born alive

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Genetic improvement of pigs is becoming an increasingly international business so any progressive pig breeding company needs to evaluate constantly whether any changes are needed in its breeding objectives and selection criteria.

With pigs and genetic material, such as semen, being sent to many different destinations worldwide it is often assumed that the nucleus farms will not be able to meet various demands in this global market. However, despite different national and regional preferences for pork products, the breeding objective stays the same and that is to increase profitability for the pig producer, wherever he farms.

Farm profitability is controlled by two major factors, the cost of production and the value of the product. Examples of each are listed in Table 1. The factors influencing production cost are consistent worldwide. Improving growth rate or numbers born alive per litter improves profitability on customer farms the world over.

Similarly, decreasing pig mortality delivers savings in all markets regardless of the country of production. A dead pig is not worth anything in Germany, Korea, Japan or the UK!

It is these fundamental principles of cost reduction in pig production, which allow JSR Genetics to supply stock from its UK nucleus farms to any location in the world, safe in the knowledge that the underlying genetic selection programme will allow the identification of animals that meet the breeding objective of increasing farm profitability.

The importance of the traits which help us to reduce costs is higher today than ever before. In all three successful companies that combined to form JSR Genetics, major selection pressures were placed on the reduction backfat. The genetics ensures that very few customers using JSR products ever experience grading problems. Markets have evolved, particularly in Asia, which do not penalise backfat to the same extent as European markets.

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There has also been a worldwide trend to base payments on lean meat yield rather than an absence of fat, so the importance of low backfat levels, measured in some markets at the so-called 'P2' position is now lower than ever before.

These changing priorities have seen resultant alterations in selection criteria, especially in dam line animals.

Previously, the value of producing an additional pig that might fail to grade well was very small. Now the value of producing an additional pig is substantially higher. The emphasis on numbers born alive in dam line animals is, therefore, greater than ever before. The result of this gradual change in emphasis is seen in the JSR Large White dam line – arguably one of the most prolific dam lines in the world.

Numbers born alive, however, is a trait with low heritability. Therefore, the proportion of the variation occurring within the trait, which is controlled by genetics alone, is low. This means that the trait is very difficult to improve by conventional selection. Coupled with this, the characteristic cannot be measured in individual gilts until after the point of selection and cannot, of course, be measured in boars.

This means that the trait of maximum importance in dam line animals is notoriously difficult to improve.

Table 1. The factors controlling farm profitability.

Cost reduction	Increased product value
Increased born alive	Optimised backfat grades
Increased growth rate	Higher meat yield
Decreased mortality	Improved meat quality

Distinct advantage

This is where the structure of JSR Genetics is a distinct advantage. Under the JSR pig production section of the company, many of the multiplication units are recorded using the same data and analysis system as the company's nucleus units. This allows substantially more data to be harvested for the calculations of genetic merit for prolificacy.

This direct link to pure animals in the multiplication tier of the breeding programme means that genetic merit for prolificacy is calculated far more accurately because a larger data set is being analysed. So the genetic merit of any one animal is calculated with data from more relatives than would otherwise be achieved. This is a major reason why animals from JSR Genetics are renowned for their prolificacy.

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Does this translate to improved prolificacy on customer farms? The JSR Farming Group structure allows us to evaluate this too. Within JSR pig production are two large commercial units. These units are run commercially and receive no preferential treatment. Both have links back to the dam line nucleus.

Over the last 12 months the top unit has achieved an average farrowing rate of 92%, numbers born alive of 12.2 and over 26 piglets weaned per sow per year.

Where does this lead our selection criteria for dam lines in the future? The genetic strategy group at JSR continually has to ask this exact question. Changes made at the nucleus level today do not affect our customers' farms for several years due to the 'genetic lag'. It is, therefore, essential that any changes reflect future market demands – not simply current trends. Future selection criteria now have to take into account the increases in numbers born alive.

	Number of farms	Number of sows	Born alive per litter	Present per sow at visit
JSR	29	177	11.23	9.94
UPB	30	161	10.78	9.61
Schaumann	31	164	11.47	9.75
West Hibrid	38	159	10.40	9.55
PIC	39	170	11.30	9.70
BHZP	40	198	10.61	9.62
Topigs	29	159	10.82	9.74

Table 2. The number of pigs surving through to weaning.

For farm profitability, numbers born alive must translate into numbers weaned and, ultimately, numbers sold to be of value.

The period of growth from birth to weaning is the key to the success of the breeding objective and includes the period of highest mortality. Numbers weaned is controlled by two components:

- The genetics of the sow and her maternal traits.
- The genetics of the piglet and early growth and vigour.

From the sow component, greater emphasis at nucleus level is now focused on the number and positioning of functional teats to select sows more able to cope with larger litters.

JSR Genetics is currently participating in a DEFRA (the UK Government Department for the Environment and Rural Affairs) funded project called 'Genomum' which looks at using genetic selection for improving pre-weaning survival of piglets. Any clear conclusions from the study will be incorporated into future breeding programmes.

Independent studies already suggest that JSR Genetics is producing more pigs which survive through to weaning. The 2002 Haus Düsse Warentest (the latest one published) is a comprehensive programme that measures the economic performance of breeding stock from a number of top breeding companies in Germany. JSR stock has produced the best overall results since it first participated in the test in 1989.

A major component of these good results has been the number of pigs surviving through to weaning. Interestingly, JSR have not necessarily had the largest litters but numbers at weaning are superior even compared with companies having sows with larger numbers born alive (Table 2).

The genetics applied to selection in JSR dam lines has, therefore, been shown to produce lines that are highly successful in prolificacy. The continuing challenge for the research and genetics team will be building on this success to further enhance farm profitability. ■