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Comparing and contrasting sow management in the US, Brazil, and Chile

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Introduction

The world pork industry is going through a state rapid, substantial change, and the pace of that change seems to have gathered considerable momentum in the last 24 months. Today, it is difficult to determine where and when these changes will stabilize. Agricultural products are abundant, with record low prices raising questions about what role the world swine producers will play in the next century. Countries, producers, and technical consultants affected by these shifts must acquire the knowledge necessary to profit from these radical changes, making use of technology and human resources as their greatest allies in the drive to improve competitive efficiency.

Setting the stage

In comparing and contrasting sow productivity in the US, Brazil, and Chile, one must understand that differences in thesse countries' production systems correspond to differences in cultures, the result of diverse experiences. The US industry's resources are being used to increase actual productivity. There is a shift to build economies of scale, with more producers becoming part of production chains that make products at more competitive costs. In contrast, Brazil is emerging as the country with the greatest potential to increase pig production. Still, today in Brazil more corn and soybeans are produced by incorporation of new land that has never been cropped. Chile by its size and population has the greatest number of constraints that inhibit the industry's competitiveness. As in many cases where the odds are against any given production process, Chile has mastered a sow herd that is highly productive, using today's technology on a sow population with very high health status.

Although the sow herds in Brazil and Chile are linked to different genetic sources in the USA and Europe, the production processes and composition of the breeding herds of these three countries share a similar composition. In addition, the swine industry in all three countries use comparable record systems; the small differences that may exist do not preclude a useful a comparison of these sow populations.

Where everything starts—the people

To compare these three countries' sow management practices, it is necessary to have had some experience with the US sow population. Having had this experience one can discern the differences between US practices and those of other industries and then apply successful strategies from other systems to increase sow productivity in the US. The differences are each important and can help create a workable system that performs by itself.

As mentioned previously, the changes in today's hog industry create an absolute need to develop a systematic approach to sow herd management. Before considering sow herd management techniques, one has to recognize that the number and quality of available human resources will dictate the success of such a system. This is where everything starts. To be precise, the human resources must include (in order of importance):

- a herd manager,
- farm personnel,
- a herd supervisor, and
- internal or external technical personnel.

Once these priorities are in place, the team must work to develop a clear process by which all individuals understand the nature of their work and their contributions to the success of the sow herd. The main contributing factors in developing the human resources for sow herds are listed in **Table 1**. This process provides a foundation on which other educational, training, and motivational tools will be applied and will give rise to improved daily work performance. It is clear that in the US, Brazil and Chile, the systems that always outperformed others were those where there was a perfect balance between the quality of the daily work and the use of sound technology. This balance continues to weigh heavily in the final results.

One can speculate that a system which shows low productivity utilizes a production scheme in which time is not available to employ quality management practices or where there is no communication downstream. This represents a major difference between the swine industry in Brazil and Chile and that of the US. The differences are, in fact, two fold: (1) there are more farm personnel to

Table 1. Main factors for the establishment of a human resource program for sow herds

- Establish a clear mission statement that can be transmitted over time.
- Farm personnel, herd managers, and supervisors must all work together as a team toward a common goal that allows continuous progress over time.
- Establish clear responsibilities to individuals or groups of individuals on a daily basis.
- Teach that success is the result of everyone's work
- Herd managers have the responsibility of instilling a good dose of inspiration and direction.
- People must be placed as the main factor of change.

perform the needed production processes in Chile and Brazil than there typically are in US systems; and, (2) the turn over rate of the Brazilian and Chilean farm personnel is lower than that seen in the US. These two factors explain some of the differences between the sow productivity in these countries.

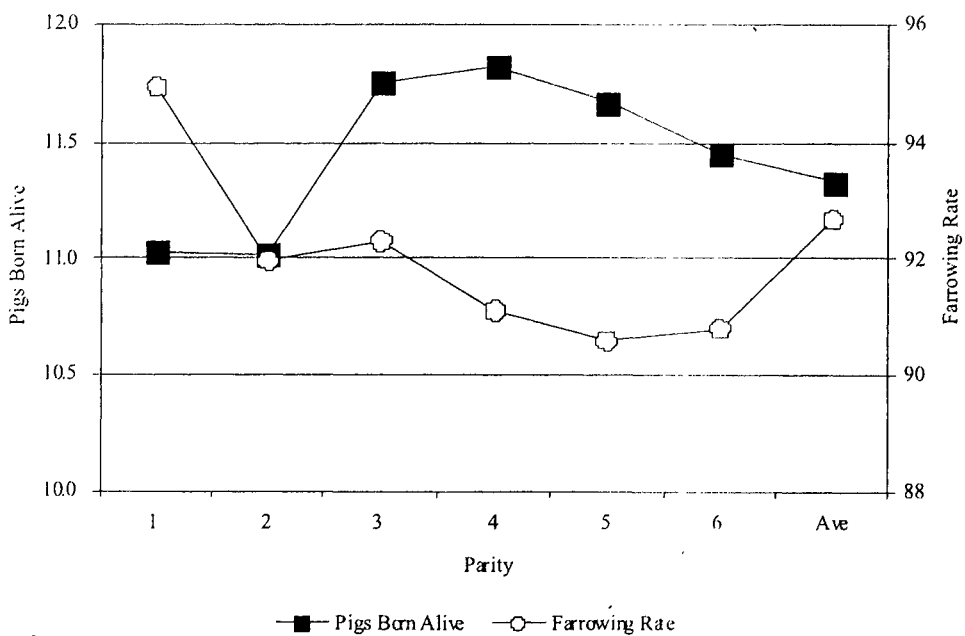
How the US will address this issue remains to be seen, but the quality of work must improve to stay competitive. At this point, the US herds may need to implement novel technology in the areas of feed delivery, equipment, and building design with a sow herd under good environment and proper health. These technologies will help to increase sow productivity with the actual farm personnel used in the sow herds.

Gilt development—where reproduction begins

During the last 30 years there has been both a considerable improvement in sow productivity and a simultaneous trend toward moving females into the breeding herd at an early age. In the early 1980s, Brazil and Chile began to develop their breeding herds, employing an aggressive gilt development program was clearly advanced for the times. Such a program is partially responsible for the high productivity seen in first litter gilts and subsequent parities (**Figure 1**).

In contrast, the productivity of first litter gilts in the United States is clearly an obstacle to the establishment herds with high lifetime reproductive performance. The program that has been used in Brazil and Chile takes into account basic steps that have been documented in the last 20 years by groups of researchers in Australia, Canada and the US.[1,2,3]

Figure 1. Gilt productivity in a large farm operation—Chile, 1998



Source: Agricola Super, Chile, 1998

In reality, US herd managers have ignored a proper gilt development program, as well as a gilt acclimatization period prior to breeding. Lately, there has been a strong shift to introduce isolation and acclimatization periods to prevent disease introduction into the herds—*not* to maximize gilt reproduction—and the effects this practive has on lifetime performance have been clearly demonstrated in different herds worldwide.[4] Under these conditions the US herds must develop aggressive programs to increase gilt productivity. Basic programs to achieve this goal are outlined in **Tables 2** and **3**. Such program center on one important concept. Puberty in females is defined as the first heat, or estrus, and naturally occurs in gilts at about 200–210 days of age. External factors can influence the onset of puberty, with exposure to a sexually developed boar being the most important factor. Gilts exposed as young as 150 days of age will develop a matured reproductive tract along with an appropriate weight and body composition that can sustain high lifetime productivity.[5]

The simple practice of exposing young, growing gilts to an external stimulus is difficult to achieve in the US under the conditions prevailing in actual breeding herds—existing herds were developed without the necessary pen arrangements and space needed for such a gilt development program. The main external stimulus—that is, the boar exposure—is seldom properly effected owing to the improper use of boars or the lack of personnel under a routine management system. If anything should be done in the US herd it is to create a successful gilt program that will be capable of increased herd productivity.

Breeding for maximum efficiency

There is no doubt that the success of a good system depends on proper resource management. Every sow herd must be defined as an operational unit with a fixed inventory, a given layout, and a given output. In the majority of herds, this is difficult to achieve, owing to inconsistent pig flow, resulting from the lack of a consistent program.

Table 2. Sexually mature boar program

- Boars are an essential part of the gilt developing and mating program
- Boars must comply with the health status of the breeding herd
- Boars are used for:
  - stimulation of gilts coming into heat
  - heat check of weaned and bred sows
- Between 5 and 7 sexually mature boars should be used for 1,000 sows
- Young boars over 8 months of age should be used with gilts and old boars used with weaned sows
- Replace boars evenly during the year for good age distribution
- Cull all non-aggressive boars regardless of age

Table 3. A three stage gilt development program

- Gilt rearing
  - isolation, acclimatization and immunization of gilts is mandatory
  - boar exposure at 150 days of age in appropriate pen, 10 minutes per day
  - feed gilts to have 15–16 mm P_2 backfat at mating and 18–19 mm P_2 backfat at farrowing
- Gilt breeding
  - breed at second or third estrus
  - target weight 280 lb at 210 days of age
  - Bbreed in contact with sexually mature boar
- Farrowing gilts
  - control of environmental temperature and comfort during farrowing
  - first 24 hours control of stillborns, colostrum intake, proper foster, and adequate temperature for piglets
  - maximum intake of feed and water after farrowing

Table 4. Sow breeding herd performance comparison, 1998

	PigCHAMP	PigCare	Brazil	Chile
Number of herds	612	405	52	19
Female inventory	624	1174	664	2620
Farrowing rate	73.2	77.5	84.8	92.44
Best 10%	85.0	85.9	87.0	94.20
Total pigs born/litter	11.2	11.5	11.2	12.0
Best 10%	12.0	11.2	11.8	12.3
Total pigs born alive/litter	10.2	10.4	10.6	11.25
Best 10%	10.9	11.2	11.3	11.49

Sources: PigCHAMP Database, 1998; PigCare Breeding Herd Performance Comparison, 1998; Agroceres, Brazil, 1998; Agricola Super, Chile, 1998

Today's management systems must be able to control the following production events if they want to stabilize their pig flows:

- replacement rate,
- culling policy,
- parity distribution,
- production of replacement gilts,
- efficiency of the gilt pool,
- breeding targets,
- sow mortality,
- pounds of feed consumed per year, and
- piglet mortality.

How these critical points are managed in a given system and whether they are under a strict control policy is the root of the differences that can be discerned between herds, sow populations, and countries. It is difficult at this point to establish how these factors weigh in each system, only the use of comparable records can give an insight into the possible variables that are influencing any given system. **Table 4** shows four record systems used in the US, Brazil, and Chile, which gives a clear perspective on the reproductive efficiency of today's sow herd.

Breeding performance in these three selected countries varied widely. The low farrowing rate and the number of pigs lost before birth in the average US herd are particularly noteworthy. In contrast, **Table 5** shows the detailed reproductive performance of Chilean swine herds. This information demonstrates that, under special circumstances, the modern sow can enjoy extremely good reproductive efficiency and can be very competitive in producing lean meat.

Clearly, there are differences that can be seen in these three countries that are in part responsible for the output of the average herds. Once more the amount and quality of work to be performed in the reproductive area will determine how it is possible to improve breeding targets. This responsibility lies heavily in the hand of the herd manager who must successfully implement a program that is stable, repeatable, and supervised on a daily basis. Today, in the average US herd this approach is more important and rewarding than the constant search for new technology.

It has been shown repeatedly that nutrition is an important factor in determining how a sow herd will perform.[6] Nutrition covers the whole life-cycle of the sow, including the growth stage for gilts. Brazil and Chile have implemented several nutrition programs closely related to those used in US herds. These programs are constantly supervised so that the total amount of nutrients delivered per day is carefully matched with existing recommendations.

Table 5. Reproductive performance, Chile, 1998

Number of sows	53,652
Number of breedings	131,364
Farrowing rate, %	92.44
Repeat breeders, %	3.84
Abortions, %	1.21
Vaginal discharge, %	0.71
Cull, dead and others, %	1.80
Wean to service, days	5.95
NPD	31.79
Sow mortality, %	4.40
Gilt pool mortality, %	0.75

Source: Agricola Super, Chile, 1998

Table 6. Critical points to monitor in a sow feed delivery program

Growing gilts	full feed used automatic feeders
Flushing gilts	if needed
Bred gilts and sows	restrict feed for 2 days after breeding
Weaned sows	full feed until breeding
Gilts in first gestation	control feed intake and body condition; 18-19 P_2 mm at farrowing
Gilts at first lactation	full feed as soon as possible; avoid weight loss
Sows in lactation	full feed as soon as possible

It is essential that the sow herd staff and those responsible for the health of the herd be fully aware of how a given sow herd is to be fed (**Table 6**).

A reasonable means of increasing pigs born alive in the US herds is by decreasing the number of stillborn at birth. The figures from the 1998 PigCHAMP database show an average of 7.3 percent stillborn in each litter. It is not uncommon to see herds loosing over one pig per litter. The degree to which stillbirths can be prevented depends on several factors, such as

- favorable farrowing conditions,
- sow condition,
- personnel quality,
- farrowing supervision,
- parity structure,and
- induce farrowing.

A herd managed well during farrowing can decrease, by at least 50%, stillbirth losses during farrowing (**Table 7**).

Harvesting the crop

Basically reproductive efficiency ends with the farrowing process and this sets the stage for the lactation phase and future growth of the piglets. Nevertheless, to start an efficient growth stage the herds must begin with a large number of pigs born alive per sow per year. Today, modern sows under very good management can deliver 28.0 pigs born alive per sow. Under these circumstances herd managers must implement strict programs to wean an adequate number of pigs with the right weight for a given age. Those US herds that follow these necessary changes will have a local advantage and will be competitive with those herds in Brazil and Chile that have mastered this practice long ago.

Table 7. Farrowing performance, Chile, 1998

No. sows	53,652
No. breedings	121,432
Pigs weaned per litter	10.31
Total pigs born	12.00
Total pigs born alive	11.25
Stillborn, %	3.88
Mummies, %	2.37
Litter scatter, %	9.29
Pre weaning mortality	8.59
Pigs weaned per sow per year	25.56

Source: Agricola Super, Chile 1998

To produce large numbers of pigs weaned will certainly require a huge effort not only by the sow but also the farm personnel. Managingthe farrowing process is where the individual work of the personnel is best seen. In general, Brazil and Chile have more human resources devoted to the farrowing process than in the US. As stated before this extra labor, if used correctly, is in part responsible for the difference observed between these two countries and the US. Listed below are some of the farrowing house practices routinely employed to improve results in Brazilian and Chilean herds:

- Farrow sows with the desired parity and in good nutritional condition.
- Foster the first 24 hours with maximum intake of colostrum.
- Keep optimum temperature and ventilation condition for the piglet and the sow.
- Maximize food consumption by the farrowed sow, especially those in their first and second litter.
- Entrust the farrowing process to responsible personnel and give it a labor structure that allows the best attention during the piglet's first three days.

It is important to conclude that there is a need to improve the reproductive efficiency of many herds in the US. Outside the boundaries of this country there is an innovative swine industry emerging to compete with US producers. The differences between the US swine industry and those industries in Brazil and Chile lie mainly in the ways in which human resources are trained and employed, the process of establishing and maintaing high health herds, and a systematic approach that centers on gilts and sows.

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