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The cost of building and maintaining an isolation unit

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Introduction

For many years, veterinarians, researchers, and producers have developed different strategies and tools to better understand and control swine diseases. Strategies like MEW, all-in, all-out pig flow, medication protocols, new diagnostic techniques and others have helped to limit the effects of diseases on production, but there is still ample space for improvement. Herds affected with serious diseases suffer losses associated with reductions in performance (feed efficiency, daily gain, pigs/sow/year, etc.), as well as increased costs for vaccination and treatment protocols. Also, the use of antibiotics in animal production is becoming a real concern because of the potential risk of increasing the resistance to human pathogens.

For these reasons, production units with a high health status will always have an advantage over herds with a more conventional health status. The challenge becomes managing the system in a way that minimizes the risk of introducing pathogenic organisms on the farm (biosecurity). Today, more and more producers see biosecurity as insurance for long-time profitability. Thus, when we plan new projects or important modifications to an existing production site, we need to plan the system to maximize biosecurity. The health control of replacement animals for these units is a point of paramount importance within the overall biosecurity plan. Producers, with the help of their veterinarian, need to obtain accurate data concerning the health status of the herd producing the incoming animals, the biosecurity rules that are observed at the farm and during transportation. When producers receive the breeding stock, a last control in isolation will assure that the pigs had no contamination on the road or just before they left the herd of origin.

The need for an isolation unit (IU)

Whether or not all farms should have an isolation unit remains a subject of debate among veterinarians. Our opinion is that, as far as nucleus and multiplier herds are concerned, there is no question they should have one. In the case of commercial herds, however, it may vary from one situation to another.

In fact, it must be kept in mind that there is a cost associated with building and maintaining an isolation unit. Just for the building, Connor and others[1] evaluated this cost to be approximately $0.41 per pig produced (if productivity of 21p/s/y) for a farrowing unit of 300 sows. Furthermore, the longer the isolation period, the more nonproductive days (NPD) accumulate. This should not be taken lightly since NPD are in many cases the most important variable affecting pigs weaned/female/year, and that gilts are responsible for a significant part of it (about 30%). Finally, there are situations where the source of replacement stock is by far more secure than the receiving herd itself can be, because of its location. Is it a good investment, for example, to pay for an isolation barn and add NPD for a farm that receives stock from a very safe and tested source, when that farm is located on a road where there is a pig barn of undetermined or poor health status every 500 feet? The need for an IU remains, at least in some cases, a question rather than an affirmation.

What is an IU?

An IU must be a building completely separated from the other production units. Our standard for the distance between the IU and the other units is a minimum of 500 feet. The IU needs to be completely independent for electricity and water supply, manure, feed, equipment, tools, supplies, clothes, and so on. We need to have the same level of biosecurity in that building as in the recipient farm. The work in that building is usually done by one of the employees of the recipient farm at the end of the day.

What are the goals of an IU?

The first goal is detection of diseases. The employee responsible for the IU needs to record daily observations of any clinical signs, including reduction in feed consumption, and treatments. The medications allowed in that unit have to be authorized by the veterinarian of the recipient farm.

The second goal is to prepare gilts and boars for reproduction. Our target is to mate gilts at their second estrus at a minimum of 135 kg (298 lb) with more than 17 mm (0.67 inches) of back fat. Depending on the weight at entry, the feeding program and the management will need to be adapted to meet these targets. In the IU, the employee will do one heat detection per day. All gilts in estrus will be recorded on the gilts' card and inseminated with dead semen. That semen should come from the recipient farm.

The third goal is an acclimatization. Acclimatization is required when there is a difference in health status between the source and recipient herds. When serology is done at the end of IU, we prefer not to vaccinate (commercial products or feed-back) during isolation, to prevent potential cross reaction with some serological tests.

Isolation protocol

The isolation period will vary between 3 and 8 weeks. Strictly from a health point of view, the longer the period, the better the prevention will be, since this allows time for any potential infection to show up clinically and/or serologically.

On a production point of view, however, we need to introduce gilts as frequently as possible so that a constant number of animals is maintained in the gilt pool. This is crucial since it has been shown that the most important factor determining the output of pigs on a farm is the number of females served, and that the best tool to achieve mating targets may be to make sure that a sufficient number of service–eligible gilts are present on the farm.[2]

Examples

In the following two examples, the cost of IU is compared to farms or systems that do not use any.

Example 1

Scenario specifications

- 5280 sows pyramid
- Annual replacement of 2500 gilts (48/week).
- Interval between entries in IU: 6 weeks
- Time between entry and blood tests: 4 weeks
- Weight of gilts at entry: 110 kg (243 lb)
- ADG between entry and mating: 700 grams (1.54 lb)
- Target weight at first mating: 135 kg (298 lb)
- Period needed between entry and first mating: 35 days

Requirements for building

To have an isolation period of six weeks and be able to introduce gilts more frequently, we will build two IUs. Each building will need to have a capacity of 150 places and will allow an introduction every three weeks. The gilts will be housed five to eight per pen, at 15 square feet per gilt. The IUs need to have a few stalls for boars. The pens will be equipped with feeders so that gilts can be fed ad libitum.

A completely separate building will always cost a minimum for all services and equipment (electricity and water supply, manure, road, feeding system, and others). When it is depreciated on a small number of animals, which is the case with an IU, the cost of space will be higher. In this case, we evaluate the cost to be at $15,000 for these services and equipment. If this cost is depreciated on 1500 places, the difference between a space in gestation and a space in IU for services and equipment will be $90. All of the remaining costs for the building

TABLE 1: Cost breakdown for Example 1—with IU

	Number of places	$ per place	Total
IU # 1	150	940	141,000
IU # 2	150	940	141,000
Space for entry in recipient farm	150	850	127,500
Gilt pool in recipient farm	150	850	127,500
Total	600	—	537,000

TABLE 2: Cost breakdown for Example 1—without IU

	Number of places	$ per place	Total
Space for estrus cycle growth/acclimatization in the recipient farm	290*	850	246,500
Gilt pool in the recipient farm	150	850	127,500
Total	440	—	374,000

*15% of that space is for gilts that will not reach the optimum target for mating and that will need extra time before the first mating.

and equipment will be considered to be the same in those buildings. In Canada, the cost for the complete construction of a gestation per space is about $850.

The recipient farm needs to have space for the gilt pool and space for the number of gilts that will be introduced every three weeks from the IU. In this case, we need 150 places for the gilt pool and about 150 places for the entry of every group. With that number of spaces, gilts need to be ready to be bred at entry. (See **Table 1**.)

What happens if the same pyramid has no IU and introduces gilts every week? The production unit will need to have space to allow gilts to cycle and reach the optimum weight and backfat. In that case, we evaluate the period of time necessary to reach the desired weight to be 35 days. (See **Table 2**.)

Non-productive days

In this example, if we use an IU, the gilts will spend 38 days in the IU and, because the entry of gilts is every three weeks, the entry to first service interval will be on average 12 days. The total NPD in this scenario is 50 days.

If an IU is not used and gilts are introduced every week, but with a period for estrus cycle growth and acclimatization, the entry to first service interval will be 35 days.

The difference between the two options is 160 spaces more with IU and the need to have two separate buildings for isolation. This means an extra cost of $163,000 for building. With a loan of 15 years at a 7% interest rate, this means a cost of about $17,500 per year.

For NPD, it will take 15 days more for the production system with an IU. This 15 days on all the replacement (2500 gilts) will increase by seven days the total NPD/sow/year. This means a cost per year of about $60,000. The overall cost to use an IU in this scenario is $77,500/year.

Example 2

Scenario specifications

- 1200 sow herd if an IU is used
- Annual replacement: 540 (10–11/week)
- Interval between entries in IU: 6 weeks
- Time between entry and blood tests: 4 weeks
- The same target for growth

Requirements for building

See **Tables 3** and **4**.

Non-productive days

In this example, if we use an IU, the gilts will spend 38 days in the IU and, because the entry of gilts is every seven weeks, the entry to first service interval will be on average 21 days. The total NPD in this scenario is 59 days.

If an IU is not used and gilts are introduced every week, but with a period for estrus cycle growth and acclimatization, the entry to first service interval will be 35 days.

The difference between the two options is 70 places at a cost of $72,100. With a loan of 15 years at a 7% interest rate, this means a cost of $7800/year.

For NPD, it will take 24 days more for the production system with an IU. This 24 days on all the replacements (540 gilts) will increase the total NPD/sow/year by 10.8 days. This means a cost per year of about $21,000. The overall cost for the IU in this scenario is $28,800/year.

Blood testing

Twenty five gilts are blood tested four weeks post-introduction of each group in the IU. If serum is tested for three diseases, the cost will be about $15/sample, or $6400 per year for example 1 and $3000 per year for example 2.

TABLE 3: Cost breakdown for Example 2—with IU

	Number of places	$ per place	Total
IU	70	1030	72,100
Space for entry in recipient farm	70	850	59,500
Gilt pool in recipient farm	30	850	25,500
Total	170	—	157,100

TABLE 4: Cost breakdown for Example 2—without IU

	Number of places	$ per place	Total
Space for estrus cycle growth/acclimatization in the recipient farm	70	850	59,500
Gilt pool in the recipient farm	30	850	25,500
Total	100	—	85,500

Discussion

For a 5,280 sows pyramid, the cost of an IU per year is approximately $83,900. This means a cost of $0.67 per weaned pig. For a 1200 sows herd, the cost of an IU per year is $32,200, which is equivalent to $1.12 per weaned pig.

In both examples, 60% of the cost of an IU is the NPD. This cost can be reduced significantly if we can introduce gilts more frequently.

Knowing the impact of diseases on production costs, those associated with the IU appear to compare very favorably.

References

1. Connor, J., Bahnson, P., Christianson, B; *IPVS*; p. 437; 1994.
2. Dial, G., Chalard, D., King, V., Rademacher, C.; *Proc. A. D. Leman Swine Conference*; p. 39; 1996.