

Assessment of Lameness, Productivity and Longevity in Group and Individually Housed Gestating Sows

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SUMMARY

The movement away from sow gestation stalls to group housing presents several major challenges in terms of facility design and sow management. Lameness is one of the most important welfare issues in sows, and factors affecting lameness and sow longevity are expected to change in group housing systems. Therefore, there is a need for objective, quantitative methods to assess lameness in pigs. This study uses several different methods of lameness detection including complex gait scoring, kinematics, accelerometers, and a force plate weigh scale. The use of these technologies in sows could lead to better early detection, quantification and understanding of sow lameness and advance our understanding of the relationship between housing, social factors, and sow lameness. Other measures studied include temperament testing and production measures. This is a 2 year study that will be concluded in 2012, with the objective of determining relationships among variables including body weight, age, social rank, body condition, health status and degree of lameness. Group and stall housed systems will also be compared, based on relative productivity, culling rate, health changes, aggression and injuries. Once the relative importance of these factors is identified, the data will be used to refine a longevity model for group housed sows, and will provide information on factors that can be expected to influence lameness and longevity in group housed systems.

INTRODUCTION

The movement away from sow gestation stalls to group housing presents several major welfare issues from the standpoint of facility design and sow management. In choosing the type of gestation housing to implement, it will be important to adopt systems that provide the greatest advantage in terms of their impact on sow welfare and longevity in the herd, as well as their impact on economic sustainability. Lameness in sows is one of the most

important welfare issues. Studies in Europe and North America have shown that lameness is the second major cause of culling after reproductive failure and represents between 8 and 15% of total culled sows (Friendship et al. 1986; D'Allaire et al. 1987; Boyle et al. 1998; Anil et al. 2005). Lameness also accounts for up to 25% of culling reasons in gilts (Tiranti & Morrison 2006; Tarres et al. 2006) and is an important criterion in gilt selection (Jorgensen 2000). Until now, qualitative visual scores of gait, standing posture or difficulty in ly-

“Lameness is one of the most important welfare issues in sows”

ing down have been the main methods used to measure lameness in pigs (Boyle et al. 2000; Bonde et al. 2004; Anil et al. 2005; Scott et al. 2006; Harris et al. 2006). However, accuracy of these qualitative methods can vary significantly among observers (Main et al. 2000). Therefore, there is a need for more objective quantitative methods to assess lameness in pigs. Several quantitative methods for assessing gait, such as kinematics and accelerometers, have been studied in dairy cattle and have recently been under investigation for use in sows. The use of these technologies in sows could lead to better early detection, quantification and understanding of sow lameness, and advance understanding of the relationship between housing, social factors, and lameness.

The objective of this study is to determine the relationship among variables such as body weight, age, social rank, body condition and health status, and degree of lameness on success within the different systems based on relative productivity, culling rate, health changes, aggression and injuries. Once the relative importance of

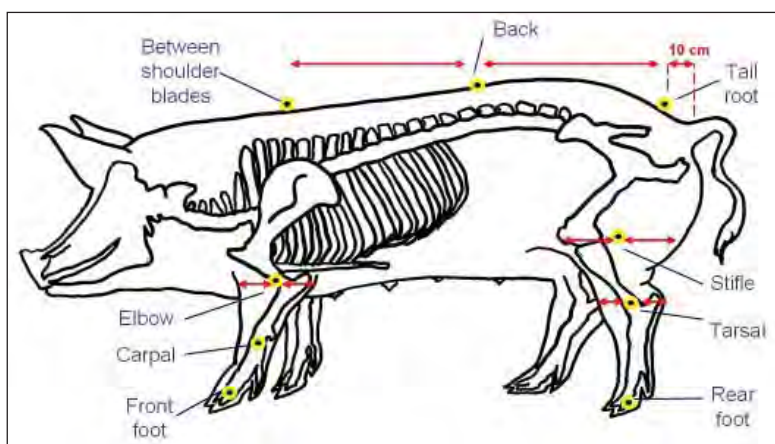


Figure 1. Position of the 15 reflective markers (3 on each leg and 3 on the back) on the sow



Figure 2. Sow walking along kinematic corridor with reflective markers

these variables has been evaluated, the information will be used to complement a group housed sow longevity model. The model will be subsequently validated and refined using data collected from each study site. The aim will be to develop a reliable model that can be used by producers to predict the economic outcome of different management practices related to longevity.

EXPERIMENTAL PROCEDURE

Data collection is currently underway, and due to be completed in July 2012. The protocols developed in Phase I are being implemented at four research stations across the country, including the Prairie Swine Centre, University of Manitoba, University of Guelph and AAFC Sherbrooke. The use of four sites is of importance as it provides data on a variety of management and housing systems. Data from each site will be incorporated into the evaluation and validation of the sow longevity/profitability model.

Assessing Lameness

Complex gait scoring

All sows are gait scored over 2 parities using a standardized qualitative scale from 0 to 4 (simplified version of Main et al., 2000). Selected sows then go on to be gait scored, and a more precise and detailed description of the gait is obtained.

Kinematics

Each selected sow is video recorded as she walks along a corridor lined with 4 ft high Plexiglas panels to ensure transparency and visibility of reflective markers by the camera. Fifteen reflective markers are placed in standardized locations on the sow's body (Figs. 1&2) in order to record her movement and speed. Recordings are being analyzed for gait characteristics including stride length, stance time, swing time, foot height, walking speed and angle variation of carpal and tarsal joints and back.

Accelerometers

An accelerometer (Hobo® data logger, Fig. 3) is placed on a rear leg of each selected sow for recording of posture and for evaluation

of stepping behaviour at feeding time. The Hobo® device is safely protected inside a Velcro®-pocket and a Vet-Rap® covering. Data on posture is collected by recording the acceleration on the x-axis (at intervals of 5 seconds) over 24 hours. Data on stepping is collected by recording the acceleration only on the x-axis, for one hour at feeding time.

Force Plate Weigh Scale

A weigh scale has been adapted for sows that uses 4 separate platforms for measuring weight distribution on each limb (Fig. 4). In Phase 1, a validation study was completed to assess accuracy and precision of the scale. Phase 2 aims to identify indicators of lameness (eg. un-balanced weight distribution, weight shifting) and comparing measures obtained with the force plate to other lameness detection methods, including kinematics, accelerometers and visual scoring.

Temperament Testing

Dominance and temperament traits are likely to affect the ability of sows to compete in group housing. Dominance is closely related to relative size, age and parity of animals in groups (Drickamer et al. 1999), while temperament is defined as relatively stable individual characteristics (Koolhaas et al. 1999). Two major dimensions of temperament have been identified in pigs. These traits can be described as 'active-passive' and 'confident-fearful' dimensions, and they are expected to affect the ability of sows to compete for social rank within group systems and also the level of aggression displayed. Sow temperament will be measured by 4 tests: the Open Door Test (ODT), Pig Approaching Human (PAH), Human Approaching Pig (HAP) and Novel Object Test (NOT). Figure 5 shows the octagonal pen used in the PAH, HAP and NOT.

Longevity Study

Data is collected regarding sow condition and lameness at 7, 16 and 20 weeks post-breeding, and production data are collected from on-farm records at the end of maternity. Sow data includes gait score, parity, weight, body condition score, and backfat. Production

data includes breeding, farrowing and weaning dates, total piglets born, total piglets weaned, and sow feed intake, as well as medical records and culling information.

CONCLUSION

The need to monitor and assess animal welfare standards on commercial farms is becoming an increasingly important issue as quality assurance schemes are expanded in response to consumer demands. Information from this project will provide tools for the accurate assessment of lameness, which is an important welfare measure that may be affected by changes to sow housing. The findings should be of particular interest as many producers in North America will be converting to group housed systems in the near future.

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Figure 3. Hobo accelerometer inside a pouch to be held around the lower hind leg



Figure 4. Force plate weigh scale



Figure 5. Octagonal temperament testing pen