Use of IBEX real-time ultrasound to determine back fat and loin depth in sows before and after parturition

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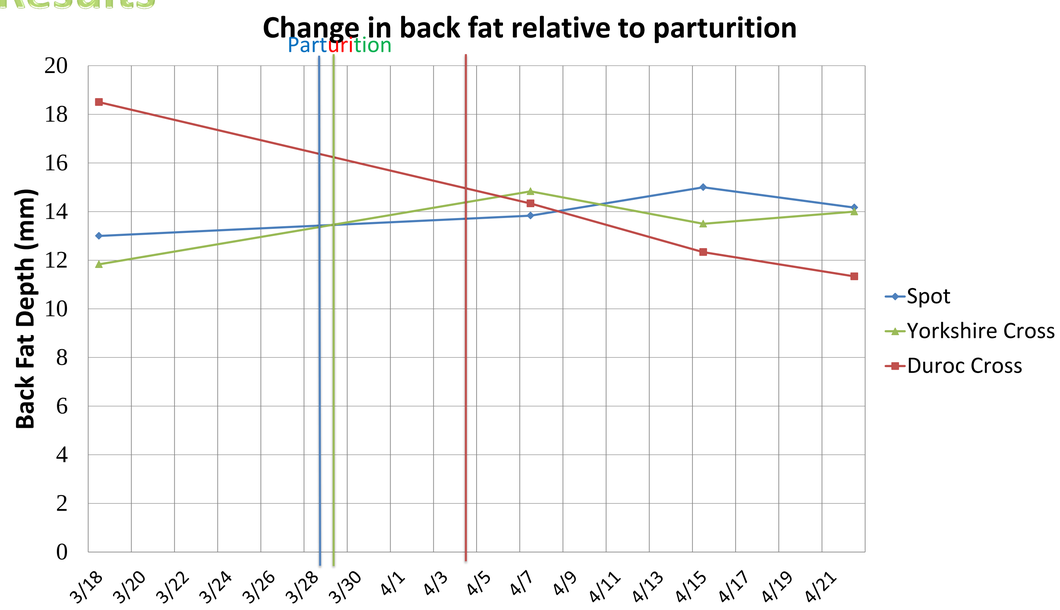
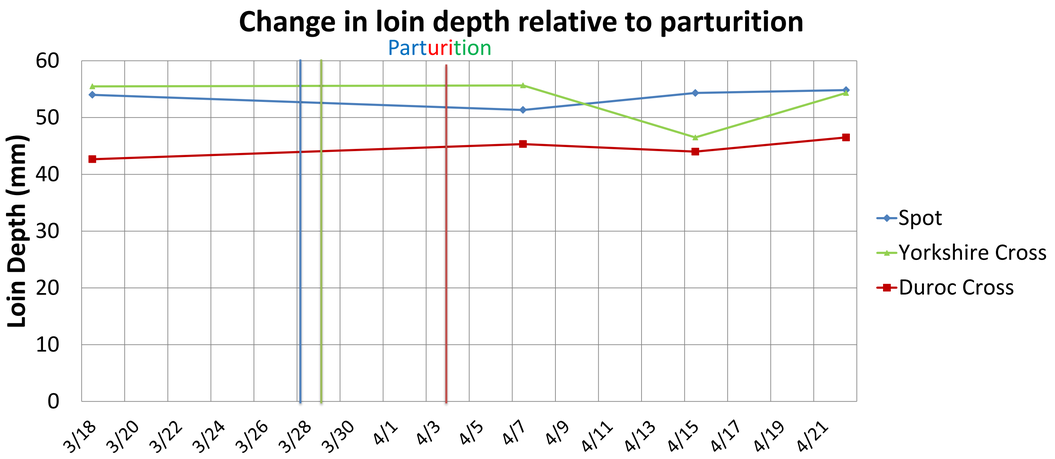
Abstract

Visual assessment of body fat deposits in sows is a common practice as an indicator of health and well being. Healthier sows generally have higher back fat depths because there is enough energy to sustain them and be stored for energy usage at a later time. The change in back fat of different sows before and after parturition indicates the amounts of energy (from fat) each sow must put into milk production to provide for her litter. Theoretically, then the sow should have a higher back fat during gestation and a lower back fat after parturition. Visual assessments of body condition in sows is subjective, therefore this project utilized a relatively new tool for swine producers to quantify changes in body fat and muscle tissue before and after parturition. To measure back fat, a 12" x 12" area of hair surrounding the last rib was clipped short beginning at the vertebral column. A real-time IBEX ultrasound took an image that revealed back fat, longissimus dorsi muscle area, and longissimus dorsi muscle depth by placing the transducer between the last two ribs. The ultrasound image was then saved and analyzed to measure the back fat depth. Measurements taken from three sows before and after parturition were compared and it was found that the real time ultrasound provided a clear visual means to measure back fat and loin muscle depths. These images show the loss of body tissue from the sow during lactation.

Results





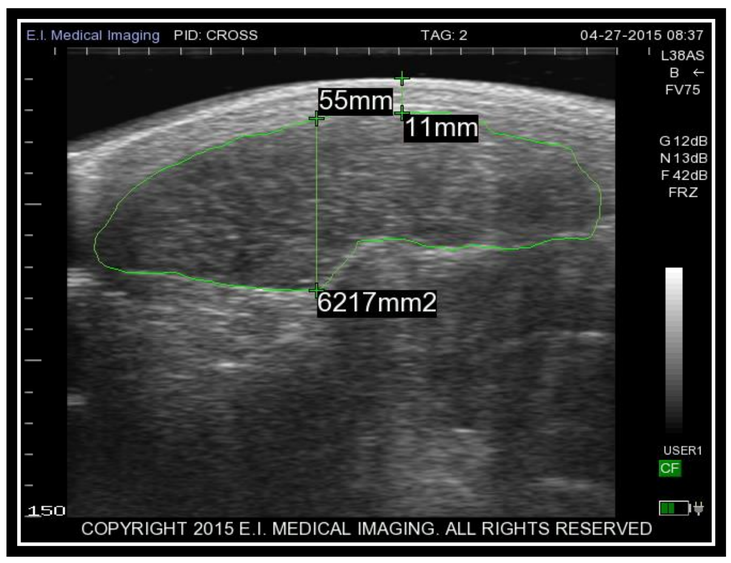
Body Condition Score

Body condition scoring is a type of qualitative assessment that uses visual indicators to give an animal a ranking. A sow with a BCS of 1-2 has some ribs showing and an undeveloped muscular pattern around the tail head and the ham. A BCS of 3 is an ideal animal that has no bones showing, the ham is well developed, and there is minimal fat around the jowl. Swine develop fat deposits on their back, ribs, tail head, and jowl. Should the ribs be undistinguishable when palpated and there is significant fat around the jowl, the animal is rated at a 4-5. An animal that is rated a 5 is extremely obese and the spine is heavily covered with fat.

Table 1: BCS vs. Back Fat

Tag	BCS	Back Fat (mm)
5	1+	9.33
1	2-	13.00
9	2-	15.50
2	2	16.83
3	2+	18.17
12	3-	19.50
10	3	18.50
13	3	19.83
17	3	19.17
4	3	13.17
19	3+	21.33
21	4	31.33
6	4+	16.67

IBEX real-time ultrasound



Ultrasound image of Yorkshire cross sow

Placement of ultrasound transducer between last two ribs

Discussion

The results from this experiment indicate that this IBEX ultrasound is an appropriate tool to measure carcass characteristics for swine. Table 1 combines a qualitative approach to determining the health of the animal while the ultrasound provides a quantitative approach. As the body condition score increases, the back fat as determined by the ultrasound continued to increase (with the exception of sow tag #6). The ultrasound was further verified in a secondary experiment that indicated some changes in back fat due to parturition depending on the sow. While the Spot sow experienced an increase in back fat after parturition, the Yorkshire Cross experienced a spike and then a gradual decrease . The Duroc cross sow experienced the most theoretically correct change in back fat because of the continuous decrease. When a sow is pregnant, 75-85% of their energy is going to maintenance (Noblet et al, 1990). The well being of the offspring is more important than the dam because of their genetic potential. In order to provide energy for the offspring, the dam must consume an involuntary amount of feed. The amount of feed a sow will consume during lactation does not meet the energy requirements and so her energy reserves begin to deplete. The Duroc sow shows this relationship because of the constant decline. As the litter began to develop and consume more milk to meet their energy requirements, her energy reserves declined. Because the sows were moved to farrowing crates shortly before parturition, there is a possibility that their nutrition improved and so the energy reserves in back fat increased in the case of the Spot sow. .This theory could be a possible explanation for the Yorkshire cross sow as well. The increase in nutrition would increase the energy reserves and as the piglets grow, they require more energy and consume more milk. This increase in lactation output would put a strain in energy reserves and so the back fat would decrease. Another strain on the body is the strong reduction in the protein:water ratio in the muscles during after parturition and during lactation (Noblet et al, 1990). Since meat mostly consists of water, a dehydrated animal would result in contraction of muscle. Both the Yorkshire and Duroc cross experienced a decrease in loin eye depth while the Spot sow had a slight increase in loin depth. The increase can be due to a smaller litter size and so she does not have a high requirement for energy, or the placement of the transducer was incorrect. Due to the farrowing crate design, it is possible that the transducer was not placed on the exact same place everytime.

Overall, the experiment verifies that this IBEX ultrasound accurately measures back fat and loin depth that is consistent with literature and qualitative methods. The pregnant sows experienced a decline in back fat and the measurements are consistent with a visual assessment of the animal.

References

Noblet, J., Dourmad, J.Y., & Etienne, M. (1990). Energy utilization in pregnant and lactating sows: modeling of energy requirements. *Journal of Animal Science* 68: 562-572.

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