

## VISUAL APPRAISAL AND MANAGEMENT CONSIDERATIONS

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Structural soundness in swine is becoming increasingly important as the degree of confinement increases. It goes without saying that improvement in structural soundness, genetically, is not predictable, recognizable or manageable if routine nutritional requirements are not met or if crippling arthritic diseases are present.

Swine confinement has historically followed a typical pattern. Finishing hogs were first moved from pasture to solid concrete floors. Other production phases have followed suit; farrowing units have eliminated bedding, slats have been installed and nurseries are totally slatted. Breeding stock traditionally has been the last group to be included in confinement breeding and gestation units. This is where the trouble begins. Contrasted to finishing hogs that will be marketed at six months of age; breeding stock will normally have to survive for considerably longer periods of time, so structural durability becomes a must.

The surface on which the pig must walk plays an important part in the longevity of his durability. Surfaces ranked from the most comfortable to the most destructive are as follows: dirt (pasture), concrete floor with bedding, concrete floor without bedding, partial slatted floors, floors with wide slats, and floors with narrow slats.

From several years experience of judging and breeding hogs, I feel the following characteristics contribute to the development of structurally unsound hogs. (1) Arch of back as viewed from the side - pigs with high arches in their top normally have a steeper slope over their rump. Our work with X-ray analysis of structure is showing that the angle of the bones from the hip to the hock is changed. The bone (tibia-fibula) from the stifle to the hock lines up on a line more nearly straight with the leg bones from the hock to the ground, which corresponds to the straight legged boars all of us have seen. These boars, will on occasion while breeding a sow, fall to the ground on their testicles because of very little flexion in the hock. It would appear that the angle of muscle-tendon attachment to the bone is changed. Human weight lifters are reported to undergo a process of muscle shortening as the weight lifting process continues. Many weight lifters walk with a muscle-bound short, choppy step and exhibit excessive movement from side to side as they walk, very similar to pigs with short choppy strides.

In the front end, X-ray analysis reveals that a pig with a highly arched top has a scapula (shoulder blade bone) that angles into the spine caudally or towards the tail. Pigs with flatter tops have the scapula intersecting the spine at a more nearly perpendicular angle. What does it all mean? Perhaps again, we have a different angle to the muscle-bone attachment; thus, structural problems arise. Specifically, we recommend that you select pigs with flatter tops and less slope to the rump.

- (2) Muscle - too much muscle and especially too much muscle on too small a frame can create the muscle-bound effect discussed under arch of top. I believe that we need to maintain a 5.00 square inch loin eye area average in our hogs to maintain our proper position in the meat industry. Some purebred breeders are totally disregarding muscle in the production of purebred breeding stock.
- (3) Rump structure - I do not qualify as an expert on rump structure; however, pigs with an extremely square rump (as viewed over the top); excessive stifle width, coupled with a distinct exaggerated widening of the top as we go from the loin to the rump and excessive bulge to the ham all spell trouble. These kind, in general, will not stay sound in confinement.
- (4) Skeletal size - I believe all of us want skeletal size. Selection for increased skeletal size will normally give us longer, taller, leaner, later maturing hogs that will gain fast (especially to heavier weights - 260 lbs?). Many boars (not all) described as extreme in skeletal size will exhibit the following problems in confinement: (a) rear and forelegs too straight (b) high arch, steep rump, uneven wear on foot pads and difficulty arising from the concrete. For many boars with extreme skeletons, arising from the concrete for their daily feed may be their major accomplishment for the day. The process of getting up would normally include folding the legs to the underside of the body, rolling over on the belly and then arising. Some big boars show an inability to easily fold the legs under the body; thus, they will lay there and flail away with their legs until they catch or hit something that will allow them to roll over to the belly. This increases the possibility of injury to already stiffened legs. Look inside the confinement units of our large commercial operations and notice the absence of extremely tall, lanky boars. What is the answer? Select large skeleton boars with body volume (width and depth) to match and boars with freedom of movement. If we were assigned the task of selecting a herd boar from a pen of ten - 300 lb. boars; we could gain considerable knowledge about a boars' muscle and mobility by watching him arise from a solid concrete floor. Those that struggle to arise will probably lack freedom of movement and correctness of muscle pattern.
- (5) Balance - pigs should be the same height at the shoulder as they are at the point where the loin joins the rump. Low fronted pigs tend to have more problems with front legs buckling over at the knees.
- (6) Fat - It is my observation that pigs with more fat (i.e. boar 1.0 inch vs boar with .6 inch fat) have less feet and leg problems. Fat pigs would tend to have less muscle which would tend to create less structural problems. Extra body fat also probably provides some insulation to both injury and cold associated problems. Obviously, we do not want to select fat boars, but it may require some compromise in terms of selection for leanness and soundness.
- (7) Even toe size - the ideal foot should include two even sized toes; the toes should be big and slightly spread to improve movement and durability in confinement. The most common fault is small inside toes. As a pig gets older and heavier, leg conformation tends to conform to the

shape of the toes. As viewed from the front, the knees will tend to get closer, undue pressure is placed on the pastern at an abnormal angle and wear does not occur evenly on the entire floor surface of the one normal sized toe pad on the foot. Eventually the normal pad begins to swell, soreness follows with subsequent lameness. The ideal pig should have four feet with eight even sized toes equally resting squarely on the floor surface. I do not know the heritability of small inside toe size, but the purchase of one boar with the problem will familiarize you with its occurrence in his offspring.

(8) Pastern slope - I would rather be troubled with too much slope rather than too little. Up to now, I have yet to see a pig go unsound because of too much pastern slope. If pasterns are too short, they will be too steep. I have noted two kinds of front leg conformation (as viewed from the side) that appear on structurally sound hogs as follows: (a) a leg that drops basically downward from the body with an easily noticeable break (slope) in the pastern with the pastern apparently serving as the major shock absorber for the front leg. (b) a leg that begins to curve as it leaves the lower part of the body and gives the appearance of a continuous curve down to the toes similar to the curve of a sickle blade. If we study front leg conformation of pigs in confinement that are sound, there is a tendency for the front leg to assume the curved sickle blade appearance as age increases. (look at some of your old sows.)

(9) Injury - some pigs are more easily injured (legs) in confinement. We give any pig in our operation treatment and opportunity to get well; but lingering problems with injury or reoccurrence means that pig will be shipped.

(10) Freedom of movement - a good bet for a durable confinement pig is one that takes a long, free stride front and rear, displays slope and cushion to both fore and rear pasterns and displays a distinct shock absorbing effect in three specific areas as follows: front leg pastern, rear leg pastern and hock. Obviously, other joints absorb the shock of movement in both the fore and rear leg, but it is not as easy to see them.

Let me be more specific about the use of X-ray for leg structure analysis. It is not something that every producer will use as an everyday tool to predetermine structural soundness. It takes patience; pigs have to be conditioned to stand normally in a restraining crate, the head has to be at a normal level or it will change bone angles. Thusfar, we have not found many surprises - bucked over front legs appear as bucked over front legs; hind legs very straight in the X-ray are viewed as very straight in the hock. Sloping pasterns X-ray as sloping pasterns.

As previously mentioned the scapula (shoulder blade bone) in flatter topped, sounder pigs intersects the spine at a nearly 90° angle (perpendicular); whereas, the scapula in high topped pigs intersects the spine approximately 20-25° from the perpendicular. This has to affect normal muscle-bone attachment relationships. In the rear legs, the femur (hip bone) intersects the ilium-ischium bone (bone over rump) at approximately a 90° angle and the major difference we have noted is in the tibia-fibula bone (runs from stifle to hock joint) which runs almost straight up and down in pigs with

excessively straight rear legs. In summary concerning X-ray, "What you see is what you got." Use the visual indicators of structural soundness and a fair percentage of leg problems can be avoided.

How can we ensure sounder hogs in our breeding program? First, we need to adopt a no-nonsense program of culling those that do not perform well because of leg problems. Secondly, we need to do a better job of buying boars from breeders that are producing sound breeding stock. I could name purebred breeders that will have a 30-60% return on boars going into commercial confinement units. These breeders fare better when selling to other purebred breeders, because these breeders will further pamper the purchased boars.

Certainly all breeding stock must receive proper nutrition and normal care should be provided and some special attention may be required for newly purchased animals to alleviate the stress of moving. Additionally not all sound pigs have a flat top etc.; if you have excellent producers in your herd that do not fit my prescribed mold for soundness, keep them and propagate them.