How to Mitigate the Effects of Feeding DDGS on Carcass and Pork Quality

Eduardo Beltranena PhD
Alberta Agriculture and Rural Development, Edmonton, AB T6H5T6
eduardo.beltranena@gov.ab.ca

At typing the title above, it reads like I will be providing insight into how to lessen the effects of something that we know affects carcass and pork quality, yet we feed it anyway. It is worth to stop and think how we got here and why we are still feeding it. Pork producers were just doing fine feeding low-cost cereal grains. But it was hard relying on foreigners to provide oil (gasoline), so why not derive a portion from corn alcohol. Subsidies to produce ethanol started and consequently distillers dried grains with solubles (DDGS) became available to feed to livestock. Pigs being a marvel beast grew well feeding on them, and some pushed feed inclusions up to 65% of the diet. This paper focus on how to mitigate the effects of feeding high inclusions of corn DDGS to hogs on carcass traits and pork quality.

Effect of Feeding DDGS on Carcass

To clarify, the effect of feeding DDGS is most evident on dressing percent instead of on carcass traits except lean. Corn grain is high in starch content. When enzymes are added to breakdown the starch, and yeast ferment its sugars to ethanol, the remaining non-starch sugars (polysaccharides), which is mostly nonsoluble fibre, concentrate about 3-fold as the starch is depleted. The pig produces no digestive enzymes to breakdown this fibre. Instead the pig relies on microbes in the hindgut to partially breakdown the fibre in DDGS before the undigested portion (~23% vs. 10% in corn grain) is excreted. To compensate for the higher fibre content of DDGS diets, the pig's gut thickens and increases in size (capacity). When hogs are eviscerated at slaughter, the guts weigh more and hold more digesta, reducing the weight of the carcass proportionally in relation to live weight (dressing percentage).

To mitigate the effect of feeding high levels (30%) of DDGS on dressing percentage, we have concluded that it is necessary to withdrawal DDGS from the finisher diet for ~3 weeks (Figure 1). It is also necessary that hogs have a fasting period without access to feed for 16 – 24h before slaughter. At least part of this fasting period should be tranquil as the stress of transport and pigs fighting can delay digestion. The effect of feed fibre on reducing dressing percent is not only limited to feeding DDGS, but also occurs feeding other fibrous feedstuffs (e.g. canola meal), even barley instead of wheat or corn grain.

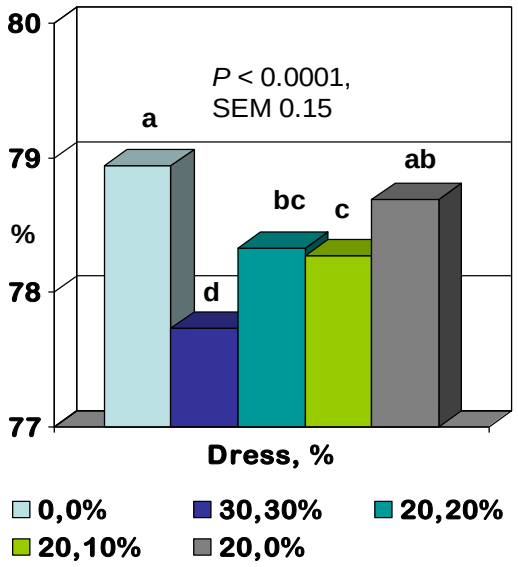

Figure 1. Withdrawal of corn DDGS from the finisher diet (20, 0%) for the last ~3 wks of the growout period corrected the reduction on dressing percentage induced by this fibrous feedstuff

Effects of Feeding DDGS on Pork Quality

That explained above for fibre concentrating ~3x as starch is depleted also applies to other nutrients. Corn grain also has a relative high content of oil (~4%) that concentrates ~3x in DDGS (11%). Most of the oil in corn DDGS is linoleic acid, a type of unsaturated fat. Because pigs have long been selected to reduce fat deposition, the type of fat they lay down reflects the fatty acid composition of what they feed. It has been long known that when hogs consumed unsaturated fats, their lard softens. That is the case when feeding corn DDGS at high dietary inclusions (>15%) and the incidence is worsen feeding diets based on corn grain.

Corn grain has slightly higher (2-3%-units) oil content that wheat or barley.

Bacon is the most affected pork cut by feeding unsaturated fats to hogs. The belly is the primary abdominal fat depot. Packers complain that 'fluffy' bellies are more difficult to slice, bacon slices stick together instead of separating easily, and consumers say the bacon appears mushy. Packers also allege that loins are softer and less appealing to Asian consumers who prefer light-cooking thinly sliced pork. Our research results indicated that a consumer panel could not discern between cooked loin chops or burger patties of hogs fed either 0 or 30% corn or wheat DDGS. However, a separate consumer panel was able to discern breakfast sausage from hogs fed either 0 or 30% corn or wheat DDGS, but only when the sausage contained >30% pork fat. The same panel could not discern among cooked ham with <15% fat from hogs fed either 0 or 30% corn or wheat DDGS.

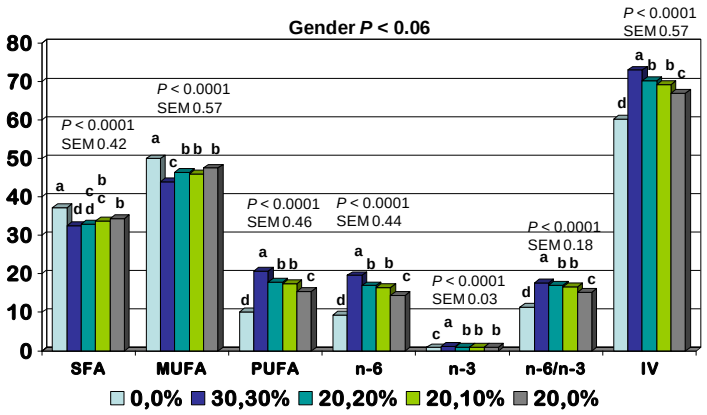

Figure 2. Feeding corn DDGS reduced saturated- (SFA) and mono-unsaturated fatty acids (MUFA), but increased poly-unsaturated (PUFA), omega-6 and -3 fatty acids in belly tissue. Withdrawal of corn DDGS from the finisher diet for ~3 weeks, improved iodine value (67 in 20,0% vs. 72 in 30,30%) but it did not restored it to that of controls fed no DDGS (0,0%)

The same strategy suggested above, withdrawing DDGS from the diet for ~3 weeks to correct the reduction in dressing percent, was also effective improving pork fat hardness (Figure 2). Although it did not restore fat hardness (iodine value) to that observed in controls fed no DDGS, it did improve it to the extent that neither packer nor consumer could likely notice the difference that we were still able to establish with chemical analysis and sophisticated instrumentation. Gilts have less body fat than barrows and are affected to a greater extent by feeding them unsaturated fats. A longer withdrawal period is therefore recommended when feeding barrows and gilts separately.

There were other minor effects of feeding corn DDGS on pork quality, but these were of less practical significance than fat hardness. Feeding DDGS reduced the amount of intermuscular fat in each of the four primal cuts (picnic, butt, loin and ham) and all four primals combined. This finding concurred with slightly greater loin depth determined at carcass grading. Feeding 30% corn DDGS enhanced loin chop darkness and reduced both drip loss and the proportion of intramuscular fat (marbling), while increasing shear force values. In view of the recent change in packer preference seeking greater intramuscular fat (marbling) in loins, feeding 30% corn DDGS thus induced the opposite trend. This trend was somewhat reversed by implementing the 3-week corn DDGS withdrawal strategy, but did not entirely corrected it.

In conclusion, withdrawing corn DDGS from the finisher diet for the last ~3 weeks of the growout period corrected the reduction in dressing percentage induced by feeding this fibrous feedstuffs and lessen the softening of belly fat. Recent processing steps resulting in the removal of a portion of the oil from corn DDGS will improve pork fat hardness; however, it will make feeding corn DDGS less economically feasible. Pork producers and nutritionists generally have more economic sources of dietary lysine, so we feed corn DDGS primarily for its dietary energy value and digestible phosphorus content. Reduced oil content in DDGS equals less dietary energy. Producers thus need to focus and compare DDGS on cost $/Mcal of Net Energy (NE) to decide whether or not to stock corn DDGS.