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An interview with
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# Ractopamine has little influence on iodine value in pig fat carcass

**Q: Does feeding ractopamine hydrochloride (RAC) to improve performance and carcass leanness also lead to high iodine values and soft pork bellies?**

**DN:** Including RAC in the late-finishing diet has no detrimental effect on belly firmness. That's based on a 2012 literature review from the University of Arkansas covering 35 published papers on the subject.[1] Other research has shown that feeding RAC does not significantly increase iodine levels.[2]

Feeding RAC can result in greater polyunsaturated fat deposition, but it doesn't compromise fresh-belly quality.[3] High iodine levels and soft bellies are primarily the result of feeding diets containing ingredients with high concentrations of unsaturated fatty acids.[4]

**Q: How are iodine levels and belly firmness related?**

**DN:** The iodine level in fat reflects the level of unsaturation in the fatty acids of fat. Unsaturated fatty acids are softer and can lead to thin, soft bellies that aren't uniform and don't hold their shape. That makes slicing bellies for bacon difficult and can also shorten shelf life — characteristics that can adversely affect export marketing.[5] Consequently, some packers are penalizing pork producers if iodine levels are unacceptable.[6]

There are different ways to determine iodine levels, which are expressed as the iodine value (IV). More recently, some packers have turned to near-infrared analysis.[7]

**Q: What's an acceptable IV?**

**DN:** The IV should be in the low 70s — specifically, around 70g to 73g per 100g of fat. Iodine values in that range indicate a more saturated fatty acid composition, which is preferable.[8] Higher values than that and you're likely to have soft bellies.

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> "...there was no difference in belly firmness between pigs fed RAC and controls..."

**Q: Can you cite evidence that RAC doesn't lead to elevated iodine levels?**

**DN:** Yes. A study from North Carolina State University demonstrated that RAC did not significantly affect the IV for carcass, backfat or belly fat. In fact, 66% of the variation in belly IV was explained by the iodine value product (IVP), which is an estimate of the amount of unsaturated fatty acids contributed by each feed ingredient. Only about 3% of the variation in the belly IV was explained by RAC, sex, season and marketing schedules.[9]

**Q: Have there been any studies specifically evaluating the impact of RAC on belly firmness?**

**DN:** In the literature review from the University of Arkansas, one of the authors' key conclusions was that RAC has no detrimental effect on belly firmness.[10]

In another study conducted by the University of Illinois using barrows, there was no difference in belly firmness between pigs fed RAC and controls, and as expected, average daily gain, feed efficiency and yield were improved in RAC-fed pigs.[11]

**Q: What dietary ingredients can lead to an unacceptably high IV?**

**DN:** There are several — most notably corn and soybean oil, animal/vegetable blends of fat, yellow grease, some bakery products and traditional dried distillers' grains with solubles (DDGS) — which are all high in unsaturated fat. There's a rule of thumb that carcass-fat IV increases 2 points for every 10% traditional DDGS fed throughout finishing.[12]

It's important to note that iodine levels can vary quite widely among fats and oils (Table 1). It stands to reason that if diets contain ingredients lower in unsaturated fat and have lower IVP values — choice white grease and beef tallow, for instance — the IV of pork carcass fat will increase but to a much smaller degree than using diets containing ingredients with higher IVP values. In addition, pigs fed certain grains, such as barley or milo, have a lower carcass IV than pigs fed corn.[13]

**Table 1. Iodine value (IV) of common fats and oils can vary widely.[14] IV is expressed as grams of iodine absorbed by 100 grams of fat.**

| | |
|---|---|
| • SOYBEAN OIL | 137-143 |
| • CORN OIL | 111-130 |
| • CHOICE WHITE GREASE | 68-70 |
| • BEEF TALLOW | 38-55 |

**Q: But don't dietary ingredients high in unsaturated fat cost less?**

**DN:** Sometimes that's true. It's tempting to use vegetable oils, animal/vegetable blends or high levels of DDGS if they price into your formulation software. However, without a strategy for the reduction or removal of these ingredients, IV may exceed acceptable levels. Let's say you're using traditional DDGS. If you switch to beef tallow or completely remove the DDGS or additional fat sources from diets several weeks before processing, carcass fat IV and belly firmness will be acceptable.[15]

**Q: How soon do dietary ingredients high in saturated fat have to be withdrawn?**

**DN:** That's going to vary with the type and amount of dietary ingredients used. The more unsaturated fat you use (the higher the dietary IVP), the sooner it will need to be withdrawn before processing.[16] An Iowa State University study demonstrated that 30% DDGS could be fed — except for the last 30 days — without exceeding the recommended carcass fat IV.[17]

Generally, if high IVP ingredients are fed in grower and early finisher feeds, I recommend they be removed a minimum of 5 weeks prior to slaughter to ensure an acceptable IV.

**Q: Are there any factors other than diet that contribute to higher iodine levels?**

**DN:** Some studies have shown IV may be higher in jowl fat than backfat.[18] However, in the Iowa State study, jowl fat IV correlated with back and belly fat IV.[19] I should note here that most packers sample the jowl because it's easy to collect, and it prevents damage to the loin that might occur if backfat is sampled.[20]

The Iowa State researchers had five purebred and one commercial crossbred line in their study. They found that pork from pigs of all those breeds had similar IV except for Durocs, which had lower values. That indicates genetics might influence iodine values.[21]

**Q: How can IV be kept to an acceptable level by producers who want the benefits of using RAC?**

**DN:** Minimize the use of dietary ingredients that have high levels of unsaturated fatty acids (high IVP ingredients) or withdraw those ingredients at least 5 weeks before processing.

Producers could also consider using dietary conjugated linoleic acid or similar commercially available ingredients that have been shown to reduce iodine levels.[22]

*continued*

> "...iodine levels can vary quite widely among fats and oils."

*For more information, contact Daniel Nelson (daniel.nelson@zoetis.com) or your Zoetis representative.*

[1] Apple J. The Influence of Paylean (Ractopamine Hydrochloride) on Pork Quality. Fact Sheet. Pork Information Gateway. December 13, 2012.

[2] Knauer M. Research Report. Pork Quality. Pork Checkoff. Developing equations for rapid and accurate prediction of carcass fat quality - NPB# 13-101. North Carolina State University. December 7, 2016.

[3] Apple J. The Influence of Paylean (Ractopamine Hydrochloride).

[4] Knauer M. Research Report. Pork Quality. Pork Checkoff.

[5] DeRouchey J, et al. Iodine Value and Its Impact on Pork Quality. The Pig Site. January 13, 2011.

[6] Miller D. Untangling the iodine value riddle. National Hog Farmer. February 15, 2012.

[7] DeRouchey J, et al. Iodine Value.

[8] Ibid.

[9] Knauer M. Research Report. Pork Quality. Pork Checkoff.

[10] Apple J. The Influence of Paylean (Ractopamine Hydrochloride).

[11] Carr SN, et al. The effects of ractopamine hydrochloride on lean carcass yields and pork quality characteristics. J Animal Sci. 2005 Dec;83(12):2886-2893.

[12] DeRouchey J, et al. Iodine Value.

[13] Ibid.

[14] Miller D. Untangling the iodine value riddle.

[15] Testroet ED, et al. Iodine values of adipose tissue varied among breeds of pigs and were correlated with pork quality. Adipocyte. 2017;6(4):284-292.

[16] Ibid.

[17] Ibid.

[18] DeRouchey J, et al. Iodine Value.

[19] Testroet ED, et al. Iodine values of adipose tissue.

[20] DeRouchey J, et al. Iodine Value.

[21] Testroet ED, et al. Iodine values of adipose tissue.

[22] Rossi R, et al. Influence of dietary conjugated linoleic acid (CLA) and L-lysine on heavy pigs' performances and meat quality. Italian J Animal Sci. 2005;4(2);464-466.

**toolbox**



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