

The Impact of Duration of Feeding and Saturation of Dietary Fats on Changes in Body Fat Over Time and on Final Carcass Lipid Iodine Values

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Trey Kellner, Research Associate; Ken Prusa, Professor, Department of Food Science and Human Nutrition; John Patience, Professor, Department of Animal Science

Summary and Implications

The inclusion of unsaturated fats in pig diets has raised issues related to pork carcass lipid quality. The objective of this experiment was to understand how withdrawal from the diet of unsaturated dietary fat prior to slaughter impacts the composition of jowl fat during the finishing period and at market. Fifty pigs (PIC 337 X C22/29; initial BW = 59.3 ± 3.64 kg), were allotted to an 82d experiment based on sex and initial BW to 10 treatments: 3 dietary fat withdrawal times prior to slaughter (21, 42 or 63d) by 3 fat sources (5% animal-vegetable blend (AV; iodine value (IV)=90.7), 2.5% corn oil (2.5%CO; IV=122.7), 5% corn oil (5%CO), plus a control diet with no added fat (CNTR) fed throughout the duration of trial. Pigs were individually housed to measure ADFI and dietary fat intake. Pigs were weighed and jowl adipose samples were collected on days 0, 21, 42, 63 and at harvest on d82. Carcass measurements were recorded at harvest using a durometer compression measurement (1 least firm; 100 most firm). Data were analyzed using PROC MIXED with treatment and sex as fixed effects, and pen as a random effect. Carcass IV (CIV) was affected by dietary fat inclusion duration across all lipid source treatments ($P < 0.01$). Dietary fat source affected firmness measured by durometer (CNTR=36, 2.5%CO=39, AV=40, 5%CO=31; $P < 0.05$). Sex did not affect CIV ($P > 0.30$) or firmness ($P > 0.13$). Duration of lipid inclusion did improve gain to feed (CNTR=0.31 kg, 21d=0.31 kg, 42d=0.33 kg, 63d=0.34 kg; $P < 0.001$). In conclusion, 2.5% CO and 5% AV maintained CIV below 74 g/100g, while a 21d withdrawal of 5% corn oil was required to maintain CIV below 74 g/100g.

Introduction

The inclusion of unsaturated fats in pig diets has raised issues related to pork carcass lipid quality. The objective of this experiment was to understand how withdrawal from the diet of unsaturated dietary fat prior to slaughter impacts the composition of jowl fat during the finishing period and at market. Feed remains the largest single expense item in the cost of production budget. Not only is feed a significant cost component, the nature of the diet also affects the performance of the animals and the quality of the final pork product. The addition of fat to the diet is a common practice

employed in order to increase energy intake and thus growth rate. The increase in the use of more fibrous ingredients, with attendant reductions in diet ME, is leading to the use of more, not less, dietary fat. The only factors suppressing the use of fat are: its high cost and potential adverse effects on carcass quality. Data areis therefore needed to allow producers to include dietary fat or other ingredients that are highly unsaturated in content for as long as possible without negatively impacting pork fat quality.

Materials and Methods

Fifty pigs (PIC 337 X C22/29; initial BW = 59.3 ± 3.64 kg), were allotted to an 82 day experiment based on sex and initial body weight to 10 treatments: 3 dietary fat withdrawal times prior to slaughter (21, 42 or 63d) by 3 fat sources (5% animal-vegetable blend (AV; iodine value (IV)=90.7), 2.5% corn oil (2.5%CO; IV=122.7), 5% corn oil (5%CO), plus a control diet with no added fat (CNTR) fed throughout the duration of trial. Pigs were individually housed to measure ADFI and dietary fat intake. Pigs were weighed and jowl adipose samples were collected on days 0, 21, 42, 63 and at harvest on day 82. Carcass measurements were recorded at harvest using a durometer compression measurement (1 least firm; 100 most firm). Data were analyzed using PROC MIXED with treatment and sex as fixed effects, and pen as a random effect.

Results and Discussion

After analyzing carcass fat samples taken from the jowl it was shown that Carcass IV (CIV) was affected by dietary fat inclusion duration across all lipid source treatments ($P < 0.01$). Corn oil at 5% inclusion level fed for a duration of 63 days had the highest CIV at 77.4 g/100g, and corn oil at 5% inclusion level fed for a duration of 42 days had a CIV of 74.2 g/100g. Therefore, when feeding Corn Oil in excess of 5%, withdrawal should be made prior to 6 weeks before market to insure pork fat quality is maintained below the industry standard of 74 g/100g. All other dietary fat sources and feeding durations resulted in an iodine value under 73 g/100g, which means that they can be used in commercial practice with little risk of negatively impacting pork fat quality. Dietary fat source affected firmness measured by durometer (CNTR=36, 2.5%CO=39, AV=40, 5%CO=31; $P < 0.05$). Sex did not affect CIV ($P > 0.30$) or firmness ($P > 0.13$). Duration of lipid inclusion did improve gain to feed (CNTR=0.31 kg, 21d=0.31 kg, 42d=0.33 kg, 63d=0.34 kg; $P < 0.001$). This re-emphasizes the value of including dietary fat for as long as possible to improve feed efficiency and barn throughput. In conclusion, 2.5% CO

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and 5% AV maintained CIV below 74 g/100g, while a 21d withdrawal of 5% corn oil was required to maintain CIV below 74 g/100g.

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Table 1. Carcass lipid iodine value sampled from the jowl measured by direct titration.

Trt ¹	CNTR	2.5% Corn Oil			5% AV Blend			5% Corn Oil			P-Value
Duration	0d	21d	42d	63d	21d	42d	63d	21d	42d	63d	
CIV (g/100g)	68.7 ^{ab}	70.2 ^{ab}	70.5 ^{abc}	72.3 ^{bc}	67.3 ^a	70.4 ^{abc}	71.9 ^{abc}	70.3 ^{abc}	74.2 ^{cd}	77.4 ^d	0.003
ADG (kg)	1.02	0.92	0.94	1.02	0.94	0.94	0.93	0.97	0.88	0.96	0.772
G:F (kg)	0.313	0.319	0.326	0.342	0.314	0.322	0.348	0.320	0.333	0.339	0.061

^{a,b,c} Means with different superscripts differ, $P < 0.05$

¹ 10 treatments: 3 dietary fat duration periods (21, 42 or 63d) by 3 fat sources (5% animal-vegetable blend (AV; iodine value (IV)=90.7), 2.5% corn oil (2.5%CO; IV=122.7), 5% corn oil (5%CO), plus a control diet with no added fat (CNTR)