Performance and Carcass Composition of Growing-finishing Pigs Fed Wheat or Corn-based Diets*

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ABSTRACT : The objective of this experiment was to compare corn and wheat in finishing pig diets in order to determine whether performance, carcass quality, fatty acid composition or fat colour is altered by choice of cereal grain. A total of 126 crossbred pigs were used in this experiment. At the start of the experiment, a portion of the experimental animals were assigned to receive a wheat-based diet formulated using soybean meal as the sole source of supplementary protein. The remainder of the pigs were assigned to a corn-based diet formulated to supply a similar level of lysine (0.65%) and energy (3,300 kcal/kg DE). At two week intervals, a portion of the pigs on the corn-based diet were switched to the wheat-based diet so that a gradient was produced with pigs being fed the corn and wheat-based diets for different proportions of the finishing period ranging from 100% on wheat to 100% on corn. There were no significant differences in the growth rate of pigs fed the two diets (p = 0.834). Pigs fed wheat tended to consume slightly less feed (p = 0.116) and had a significantly improved feed conversion (p = 0.048) compared with pigs fed corn. Choice of cereal did not affect dressing percentage (p = 0.691), carcass value index (p = 0.146), lean yield (p = 0.134), loin fat (p = 0.127) or loin lean (p = 0.217). Fatty acid composition of backfat was unaffected by the cereal grain fed (p>0.05). Total saturated fatty acid content was 33.31% for both corn and wheat fed pigs (p = 0.997) while the polyunsaturated fatty acid content was 12.01% for corn fed pigs and 11.21% for wheat fed pigs (p = 0.257). The polyunsaturated/saturated ratio was 0.36 for pigs fed corn and 0.34 for pigs fed wheat (p = 0.751). Hunter Lab Colour Scores indicated no difference either in the whiteness or yellowness of the fat. In conclusion, wheat can substitute for corn in growing-finishing pig rations without detrimental effects on pig performance. There were no differences in either the fatty acid composition of backfat or in backfat colour indicating that the decision to use wheat vs. corn needs to be made on economic grounds rather than being based on their effects on fat quality. ***(Asian-Aust. J. Anim. Sci. 2005. Vol 18, No. 5 : 704-710)***

Key Words : Corn, Wheat, Pigs, Performance, Backfat, Fatty Acids, Colour

INTRODUCTION

Meat quality is becoming an increasingly important issue for meat processors and consumers (Wood et al., 2003; Kim et al., 2004; Raes et al., 2004). For pork, the consistency and colour of fat and lean are important attributes affecting consumer acceptance (Topel et al., 1976; Wachholz et al., 1978; Jeremiah, 1994), storage stability (Gray et al., 1996) and further processing (Warnants et al., 1998; Rodgers and Etzler, 2000).

Diet is known to have a profound influence on pork quality (Bosi, 1999; Choi et al., 2001). However, most recent research has focussed on the effects of altering the type and amount of dietary fat (Corino et al., 2002; Gatlin et al., 2002; Pastorelli et al., 2003) while choice of cereal grain has received little attention as a factor affecting pork quality. Although corn is the most widely utilized energy source in the swine industry, there are many suitable alternatives that can be used to meet the nutritional requirements of swine while reducing ration costs (Thacker and Kirkwood, 1990). One such alternative is imported wheat (Myer et al., 1999).

Pigs fed on corn-based diets perform well but may produce a yellow-coloured fat that is discriminated against by many consumers (Ministry of Agriculture and Forestry, 2003). The yellow-coloured fat is thought to be due to the presence of carotenes and xanthophylls in corn (Bauernfeild et al., 1981). Because wheat lacks the carotenoid content that yellow corn possesses (Novus, 1994), it has been hypothesized that wheat-fed pigs will yield a higher meat and fat quality that is desired by the export market.

The polyunsaturated fatty acid (PUFA) content of corn is also higher than wheat (19.1 vs.9.1 g/kg; NRC, 1994). Increases in dietary PUFA are known to increase the PUFA content of pork fat (Warnants et al., 1999; Jaturasintha et al., 2002; Thacker et al., 2004). While an increase in the PUFA content of pork fat is desirable from a human health perspective (Caggiula and Mustad, 1997), the incorporation of PUFA into pork fat can adversely affect further processing and storage stability (Gatlin et al., 2002). Oxidative processes, to which PUFA's are particularly susceptible, can lead to rancidity and a "warmed over" flavour (Gray et al., 1996). Oxidation can also result in a reduction in the nutritional value of the meat with loss of vitamins A, D and E and production of toxic molecules from cholesterol oxidation (Kubow, 1990). Finally, high

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Table 1. Ingredient composition (% as fed) of finisher diets containing either wheat or corn

	Wheat diet	Corn diet
Corn (7.8% CP)	0.00	80.45
Wheat (13.67% CP)	87.13	0.00
Soybean meal (46.5% CP)	8.49	15.37
Tallow	0.46	0.00
Dicalcium phosphate	1.27	1.49
Limestone	0.95	1.08
Salt	0.50	0.50
Lysine	0.21	0.11
Vitamin-mineral premix[1]	1.00	1.00

[1] Supplied per kilogram of diet: 8,250 IU vitamin A; 825 IU vitamin D_3; 40 IU vitamin E; 4 mg vitamin K; 1 mg thiamine; 5 mg riboflavin; 35 mg niacin; 15 mg pantothenic acid; 2 mg folic acid; 12.5 μg vitamin B_{12}; 0.2 mg biotin; 80 mg iron: 25 mg manganese; 100 mg zinc; 50 mg Cu; 0.5 mg I; 0.1 mg selenium.

concentrations of PUFA's reduce the shelf life of pork and pork products and soften the meat making it more difficult to slice the bacon (Rodgers and Etzler, 2000), producing more miscuts and a higher percentage yield of lower quality product (Gatlin et al., 2002).

The objective of the following experiment was to compare corn and wheat in finishing pig diets in order to determine whether performance or carcass quality are altered by the choice of cereal grain. The effects of the two energy sources on fat colour and the fatty acid composition of backfat was also determined.

MATERIALS AND METHODS

Growth trial

A total of 126 crossbred pigs (Camborough 15 Line female×Canabred sire, Pig Improvement Canada Ltd, Airdrie Alberta) were used in this experiment, which was conducted in two replicates. The first replicate started November 5, 2001 and was comprised of 54 barrows weighing 57±8.1 kg. The second replicate started October 23, 2002 and was comprised of 36 barrows and 36 gilts weighing 43.6±3.9 kg.

At the start of each replicate, a portion of the experimental animals were randomly assigned to be fed a wheat-based diet formulated using soybean meal as the sole source of supplementary protein (Table 1). The remainder of the pigs were assigned to a corn-based diet formulated to supply a similar level of lysine and energy as the wheat-based diet. At two week intervals, a portion of the pigs on the corn-based diet were switched to the wheat based diet so that a gradient was produced with pigs being fed the corn and wheat-based diets for different proportions of the finishing period ranging from 100% of the finishing period on wheat to 100% of the finishing period on corn. In the end, 35 pigs received wheat throughout the finishing period, 23 received wheat for 20-40% of the finishing period, 16 received wheat for 40-60% of the finishing period, 23 received wheat for 60-80% of the finishing period and 29 pigs were fed corn for the entire finishing period.

The diets were formulated to contain similar levels of lysine (0.65%) and energy (3,300 kcal/kg DE) by the addition of synthetic lysine and tallow to the wheat-based diet. Book values for digestible energy and amino acids obtained from the National Research Council were used as the basis for the ration formulation. All diets were supplemented with sufficient vitamins and minerals to meet or exceed the levels recommended by the National Research Council (1998). The diets were pelleted using low-pressure steam at approximately 60°C.

The pigs were housed in unisex groups of four in 2.7×3.6 m concrete floored pens and were provided with water *ad libitum*. The pens were equipped with four individual feeders. Each pig was allowed access to its own individual feeder for 30-min twice daily (07:00 h and 15:00 h). Individual body weight, feed consumption and feed conversion were recorded weekly. Pigs were assigned to feeders in such a way as to minimize the potential for treatment effects to be confounded with environmental effects.

Carcass measurements

The pigs were slaughtered at a commercial abattoir at an average weight of approximately 115 kg. Carcass weight was recorded and dressing percentage calculated. Carcass fat and lean proportion measurements were obtained with a Destron probe (model PG-100, Anitech Identification Systems, Inc., Ottawa, Canada) placed over the 3rd and 4th last ribs, 70 mm off the midline. These values were then used in calculating Carcass Value Indices according to the table of differentials in effect at the time of the experiment (Saskatchewan Pork International, 2000).

Samples of backfat were obtained from the pigs in the first replicate in order to determine the effects of feeding the two grains on the fatty acid composition of pork. The day following slaughter, a 6 mm cork borer was drilled into the fat at the widest point of the chilled carcass (approximately mid-loin and 5 cm off the midline) and the entire core sample of fat (from skin to muscle) was then obtained. The fat samples were immediately frozen and stored at -5°C until analysis.

Chemical analysis

Samples of the rations were analysed in duplicate according to the methods of the Association of Official Analytical Chemists (1990). Analyses were conducted for moisture (AOAC method 930.15), crude protein (AOAC method 984.13), acid detergent fibre (AOAC method 973.18), ash (AOAC method 942.05) and ether extract

(AOAC method 920.39). An amino acid analysis of the diets was performed using a LKB-Biochrome 4151 Alpha Plus Amino Acid Analyser after hydrolysis for 22 h with 6 N HCl. Performic acid hydrolysis was not performed. Analyses for carotenes and xanthophylls were conducted using AOAC method 970.64 (AOAC, 1990).

Fatty acid analysis

Fat was extracted from the adipose tissue using a modification of the Folch wash method (Mir et al., 2000). The backfat samples (approximately 500 mg) were placed into a screw-capped tube and 1 ml of chloroform/methanol (2:1 v/v) solution was added. The samples were then homogenized two times in 2 ml of the same chloroform/methanol solution using a vortex blender. The rinse fluid was combined. The tube was flushed with nitrogen then placed on a test tube rocker for 10 min and then centrifuged at 1,875×g for 30 minutes. The supernatant was transferred to a clean screw-capped tube then 7 ml of 0.29% NaCl solution was added. The tube was again flushed with nitrogen and placed on a test tube rocker for a further 10 minutes, followed by centrifugation at 1,875×g for 30 minutes. The upper layer was removed by suction leaving the lower chloroform layer containing the lipid. The chloroform was evaporated under nitrogen in a 40°C water bath and the extracted lipid stored at -20°C for later analysis.

Extracted lipid was derivatized using tetramethylguanidine (TMG) and methanol with heneicosanoic acid as the internal standard (Shantha et al., 1993). About 40 mg of extracted lipid was redissolved in 2 ml of hexane in a test tube and 25 μl of 20 mg/ml heneicosanoic acid was added, followed by 400 μl of methanol and 100 μl of TMG. The tubes were flushed with nitrogen, capped and heated in boiling water for 10 min. After cooling, 5 ml of saturated NaCl solution was added followed by 2 ml of petroleum ether. The organic phase was transferred to a new test tube and evaporated under nitrogen. The contents were then re-suspended in 2 ml hexane for injection into the gas chromatograph.

Fatty acid analysis was carried out in duplicate on a Supelcowax-2340 60 m×0.25 m×0.2 um column (Sigma Aldrich Ont. Canada) installed in an Agilent 6890 Series GC system using a flame ionisation detector with capillary injection system at a split ratio of 1:100. The oven temperature was set at 150°C then raised to 200°C at 1.5°C/min and then finally held for 10 minutes. Helium was used as carrier gas at a flow rate of 1.7 ml/min. Identification of the fatty acids was achieved by comparison to retention times of known standards (Sigma Aldrich Ont. Canada) and amounts present were determined by calculation based on the internal standard.

Total saturated fatty acids were calculated as the sum of the C12:0+C14:0+C16:0+C18:0 fatty acids while total polyunsaturated fatty acids were calculated as the sum of the C18:2+C18:3 fatty acids (Raes et al., 2004). The polyunsaturated/saturated fatty acid ratio was calculated from these values.

Fat colour determination

Colour of backfat was determined at the Meat Science Laboratory at the University of Saskatchewan using a Hunter Lab Colour Flex (Hunter Associates Laboratory Inc., 11,491 Sunset Hills Road, Reston, Virginia). Frozen fat samples were thawed in a 4°C cooler overnight. The cores were cut approximately 1 cm from the skin to expose a fresh, flat surface to measure colour. This fresh cut surface was placed, cut surface down, in a plastic 5.5 cm petri dish. The petri dish was then placed onto the HunterLab Colour Flex with the machine set on illuminant A, observer 10. L*, a* and b* readings were then recorded. The average of two readings was utilized. The L* reading is a measure of the lightness or darkness of a sample, the a* reading is a measure of the redness or greenness of the sample (the more positive the number, the redder the sample), while the b* reading is a measure of yellowness and blueness (the more positive the number, the more yellow the sample).

Statistical analysis

The experimental data was statistically analysed using two methods. Firstly, a comparison was conducted using only data from pigs fed corn (N = 29) or wheat (N = 35) during the entire finisher period. The data from the performance trial and carcass data were analysed as a 2×2 factorial using the General Linear Models procedure of the Statistical Analysis System Institute, Inc. (SAS, 1999) with the factors in the model consisting of type of cereal (corn vs. wheat), sex of pig (barrows and gilts) and their interaction. The fatty acid composition of backfat and fat colour was analysed as a one-way ANOVA. Since the pigs were fed individually, they were considered the experimental unit for all statistical analysis and pen was never considered in any analytical model.

The data for all pigs was then analysed using simple regression analysis. As the time to reach market weight varied for each pig, the number of days that a pig was fed wheat was expressed as a percentage of the time it took each pig to reach market weight. A simple regression analysis was conducted to relate the various parameters tested to the proportion of the finishing period the pigs were fed wheat. The slope of the line and intercept were generated using Microsoft Excel. A line with a slope that did not differ from zero was taken to mean that the parameter was not affected by the proportion of the finishing period that the pig was fed wheat (i.e. to indicate no difference between wheat and corn).

Table 2. Chemical composition of wheat and corn-based experimental diets (% as fed)

	Wheat diet	Corn diet
Chemical composition		
Moisture	12.49	12.07
Crude protein	16.12	13.97
Ash	4.04	4.63
Ether extract	2.55	3.09
Acid detergent fibre	3.87	3.21
β-carotene (mg/kg)	0.18	0.26
Xanthophylls (mg/kg)	5.28	6.33
Amino acid content		
Arginine	0.91	0.80
Histidine	0.36	0.34
Isoleucine	0.52	0.42
Leucine	1.01	1.21
Lysine	0.69	0.66
Methionine and cystine	0.77	0.58
Phenylalanine	0.71	0.68
Threonine	0.55	0.59
Valine	0.70	0.68
Fatty acid content		
Lauric acid (C12:0)	nd	nd
Myristic acid (C14:0)	0.16	0.16
Palmitic acid (C16:0)	0.13	0.21
Stearic acid (C18:0)	nd	nd
Oleic acid (C18:1)	1.00	1.40
Linoleic acid (C18:2)	1.02	1.08
Linolenic acid (C18:3)	0.24	0.22

[1] nd: Not detected.

RESULTS

The results of the chemical analysis conducted on the two diets are presented in Table 2. The crude protein content of the wheat-based diet was considerably higher than that of the corn based diet (13.97 vs. 16.12) reflecting the higher crude protein content of wheat vs. corn. However, this was expected as the diets were formulated to be similar in lysine content not in crude protein. The ether extract content of the corn-based diet was slightly higher than that of the wheat-based diet while the acid detergent fibre content of the corn-based diet was slightly lower than that of the wheat-based diet. These differences were to be expected based on the chemical composition of the predominant cereal grain used in the respective diets. The amino acid analysis confirmed that the diets supplied similar levels of lysine and threonine, the first and second limiting amino acids in corn and wheat based diets fed to swine (Lewis, 2001). The fatty acid analysis of the experimental diets indicated that oleic and linoleic acids were the predominant fatty acids in the two diets.

The performance of pigs fed either the wheat or corn-based diet throughout the entire finishing period is shown in Table 3. There were no significant differences in the growth rate of pigs fed the two diets ($p = 0.834$). Pigs fed wheat tended to consume slightly less feed ($p = 0.116$) and had a significantly improved feed conversion ($p = 0.048$) compared with pigs fed corn. Castrate males had better daily gain ($p = 0.001$), higher feed intakes ($p = 0.001$) but poorer feed conversion ($p = 0.021$) than gilts. The linear regressions relating the proportion of the finishing period the pigs were fed wheat (X) to performance parameters were:

Daily gain = -0.0003X+1.10 ($R^2 = 0.005$)
Feed intake = -0.0022X+3.16 ($R^2 = 0.028$)
Feed conversion = -0.0014X+2.88 ($R^2 = 0.039$)

The effects of feeding wheat vs. corn during the finishing period on swine carcass traits are shown in Table 4. Choice of cereal did not affect dressing percentage ($p = 0.691$), carcass value index ($p = 0.146$), lean yield ($p = 0.134$), loin fat ($p = 0.127$) or loin lean ($p = 0.217$). Carcasses from castrate males had a lower dressing percentage ($p = 0.001$), carcass value index ($p = 0.015$), lean yield ($p = 0.001$), and loin lean ($p = 0.035$) than gilts.

Table 3. Effects of feeding corn vs. wheat on pig performance during the finishing period

	Cereal grain		Sex		P values		
	Corn	Wheat	Males	Females	Cereal	Sex	C×S
Daily gain (kg)	1.10±0.17	1.10±0.17	1.18±0.13	0.93±0.11	0.834	0.001	0.777
Daily intake (kg)	3.13±0.54	2.98±0.54	3.34±0.39	2.46±0.29	0.116	0.001	0.632
Feed conversion	2.84±0.33	2.70±0.17	2.83±0.29	2.66±0.18	0.048	0.021	0.360

Table 4. Effects of feeding wheat vs. corn during the finishing period on swine carcass traits

	Cereal		Sex		P Values		
	Corn	Wheat	Males	Females	Cereal	Sex	C×S
Slaughter weight (kg)	117.76±11.15	112.50±6.61	118.32±10.15	108.82±3.47	0.012	0.001	0.048
Carcass weight (kg)	89.97±7.52	85.68±4.21	89.05±7.25	85.78±3.98	0.006	0.069	0.056
Dressing percentage (%)	76.53±2.77	76.28±3.11	75.33±2.65	78.80±1.85	0.691	0.001	0.713
Carcass value index	107.17±5.82	109.17±5.31	106.93±5.62	110.78±4.77	0.146	0.015	0.311
Carcass lean yield (%)	58.49±2.75	59.40±2.33	58.22±2.49	60.49±2.13	0.134	0.001	0.470
Loin fat (mm)	23.57±7.29	21.17±5.49	24.09±6.69	18.71±4.56	0.127	0.003	0.459
Loin lean (mm)	54.56±8.14	57.06±8.14	54.22±7.42	59.15±8.98	0.217	0.035	0.645

Table 5. Effects of feeding corn vs. wheat during the finishing period on the fatty acid composition of backfat (g/100 g of backfat)

	Corn	Wheat	P value
Lauric acid (C12:0)	0.09±0.10	0.08±0.01	0.742
Myristic acid (C14:0)	1.36±0.60	1.81±1.23	0.225
Palmitic acid (C16:0)	21.40±1.90	21.10±1.61	0.706
Palmitoleic acid (C16:1)	2.58±0.45	2.55±0.50	0.895
Stearic acid (C18:0)	10.45±1.64	10.31±1.59	0.845
Oleic acid (C18:1)	48.36±2.79	47.77±1.94	0.599
Linoleic acid (C18:2)	11.43±1.05	10.54±2.20	0.180
Linolenic acid (C18:3)	0.58±0.16	0.67±0.13	0.186
Total saturated fatty acids	33.31±3.02	33.31±2.54	0.997
Total polyunsaturated fatty acids	12.01±1.05	11.21±2.51	0.251
Polyunsaturated /saturated ratio	0.36±0.05	0.34±0.06	0.751

However, loin fat was significantly higher (p = 0.003). The linear regressions relating the proportion of the finishing period the pigs were fed wheat (X) to carcass parameters were:

Dressing percentage = 0.0049X+76.47 (R^2 = 0.004)
Carcass value index = 0.029X+107.14 (R^2 = 0.040)
Carcass lean yield = 0.0119X+58.39 (R^2 = 0.039)
Carcass loin fat = -0.0314X+23.60 (R^2 = 0.044)
Carcass loin lean = 0.0279X+54.62 (R^2 = 0.019)

The effects of feeding wheat vs. corn during the finishing period on the fatty acid composition of backfat are shown in Table 5. Oleic and palmitic acids were the principle fatty acids found in backfat. Fatty acid composition was unaffected by the cereal grain fed during the finishing period (p>0.05). Total saturated fatty acid content was 33.31% for both corn and wheat fed pigs (p = 0.997) while the polyunsaturated fatty acid content was 12.01% for corn fed pigs and 11.21% for wheat fed pigs (p = 0.257). The polyunsaturated/saturated ratio was 0.36 for pigs fed corn and 0.34 for pigs fed wheat (p = 0.751). The linear regressions relating the proportion of the finishing period the pigs were fed wheat (X) to the fatty acid composition of backfat were:

Saturated fatty acids = -0.0135X+32.91 (R^2 = 0.015)
Polyunsaturated fatty acids = -0.0039X+11.83 (R^2 = 0.0041)

The effects of feeding wheat vs. corn during the finishing period on the colour of backfat are shown in Table 6. Backfat colour was unaffected by the choice of cereal grain fed during the finishing period. Hunter Lab Colour Scores indicated no difference either in the whiteness or yellowness of the fat (p>0.05). The linear regressions relating the proportion of the finishing period the pigs were fed wheat to the colour of backfat were:

Table 6. Effects of feeding corn vs. wheat during the finishing period on Hunter Lab Colour values of backfat

	Corn	Wheat	P value
L* value (whiteness)	77.63±1.40	77.87±1.82	0.708
a* value (redness)	7.90±1.17	7.89±1.05	0.977
b* value (yellowness)	10.99±1.13	10.96±0.79	0.942

Backfat whiteness = -0.0001X+77.44 (R^2 = 0.000)
Backfat yellowness = -0.0011X+10.91 (R^2 = 0.0021)

DISCUSSION

The results of the performance trial indicate that both corn and wheat are excellent energy sources for use in growing-finishing pig diets. When used during the entire finishing period, the growth rate of the pigs fed diets based on the two cereal grains was identical (1.10 kg/day), while pigs fed wheat showed a slight advantage in terms of feed conversion (2.70 vs. 2.84). These results are similar to the findings of McConnell et al. (1975), Han et al. (1976) and Bell and Keith (1993) who reported no significant differences in the performance of pigs fed wheat vs. corn. Van Lunen and Schulze (1996) reported similar growth rates but lower feed conversion for pigs fed a 60% wheat-based diet in comparison with a diet containing 20% wheat and 40% corn.

In terms of carcass traits, there were indications that wheat produced a superior carcass to corn. Although not statistically significant, the experiment indicated a trend (p<0.15) towards a higher carcass value index, higher lean yield percentage and lower loin fat for pigs fed wheat vs. corn. These findings support the work of Han et al. (1976) who reported lower backfat thickness and a higher grade for pigs fed wheat in place of corn. Bell and Keith (1993) reported numerically lower backfat thickness but no change in lean yield or carcass index when wheat replaced corn in finisher pig diets. Brendemuhl et al. (1996) reported similar backfat levels and longissimus muscle area for pigs fed corn and wheat-based diets

Feeding wheat vs. corn had no effect on the fatty acid composition of backfat. Oleic and palmitic acid were the principle fatty acids found in backfat, which agrees with the findings of Bredemuhl et al. (1996). Although the corn-based diet had a slightly higher percentage of unsaturated fatty acids than the wheat-based diet, the fatty acid composition of the backfat of pigs fed the two diets was similar. Retail pork generally has a polyunsaturated/saturated fatty acid ratio of between 0.2 and 0.3 (Breidenstein, 1987). In the present study, the polyunsaturated/saturated fatty acid ratio was 0.36 for the corn diet and 0.34 for the wheat diet. For improved human health, the aim is to increase the polyunsaturated/saturated ratio of meat products above 0.4 (Wood et al., 2003). It would appear that dietary changes other than simply altering the choice of cereal grain used in swine diets would have to be made in order to accomplish this goal. Recent research has investigated fat sources high in unsaturated fatty acids such as rapeseed and corn oil (Corino et al., 2002; Pastorelli et al., 2003), soybean oil (Gatlin et al., 2002), catfish oil (Rodgers and Etzler, 2000) and flaxseed (Thacker et al., 2004).

Surprisingly, there was no difference in the colour of backfat between pigs fed diets based on the two cereal grains. Backfat from all pigs was relatively white and there was no evidence of the yellow colour suggested to be present in corn-fed pigs. Both cereal grains produced a visually acceptable carcass fat. The carotene and xanthophylls content of corn are known to be influenced by genetics and the environment (Bauernfeind et al., 1981). The carotenoid content of the corn-based diet used in the present experiment was at the lower end of the carotenoid content of 44 corn lines tested by Kurlich and Juvik (1999). Therefore, it would appear that feeding corn to pigs does not always result in yellow fat and that consideration should be given to measuring the carotene and xanthophylls content of the corn to be fed in situations where white fat is desired.

In conclusion, it would appear that wheat can substitute for corn in growing-finishing pig rations without detrimental effects on pig performance and actually producing a slightly better carcass than pigs fed corn. There were no differences in either the fatty acid composition of backfat or in backfat colour indicating that the decision to use wheat vs. corn needs to be made on economic grounds rather than on its effects on fat quality.

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