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A comparative study in Thailand on carcass and meat quality in pig production based on increasing landrace lines

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Abstract
Duroc (D), Landrace (LR) and Large white (LW) are the common pig breeds commercially used in Thailand. This study was set up to evaluate if the LR could be used in crossbreeding programmes at levels higher than 25 % and up to 62.5 % without loss in performance. Fourteen finishing crossbred (D x (LR x LW)) pigs at 50:25:25 and 26 finishing crossbred (LR x (D x (LR x LW))) pigs at 25:62.5:12.5 were offered the same feed from 30 kg for 110 days under the same management conditions. The carcass traits were examined after slaughtering. The carcass weight of pigs with 62.5 % LR were significantly ($P<0.05$) higher than the pigs with 25 % LR (84.21 vs 78.48 kg). Weight significantly ($P<0.05$) affected the dressing percentage (73.46 vs 73.02 %, respectively) but there were no significant ($P>0.05$) differences in carcass length, loin eye area, back fat thickness and lean meat percentage. Meat quality traits in terms of redness (a*) of 62.5 % LR was significantly ($P<0.05$) higher than of 25 % LR and higher a* -value was associated with darker meat. There were no significant differences ($P>0.05$) in such direct meat quality traits as water losses and shear force value. The 62.5 % LR tended to have slightly favourable carcass traits and meat quality compared to the 12.5 % LR. From a meat production perspective, LR can be included in cross-breeding programmes at 62.5 % with D and LW.

Introduction
In recent years, there has been a growing number of research programs to improve pig carcass and meat quality. One of the generally accepted means among meat scientists to achieve this aim, is genetic improvement (Bass *et al.,* 1992). Crossbreeding of selected breeds which will eventually bear the most favourable genetic traits in crossbred progeny is normally carried out. In Thailand, Landrace (LR), Large White (LW) and Duroc (D) have been introduced to achieve this purpose for a long time (Chansawang, 1991; Sanboa *et al*., 1991). It has been found that D has an advantage in having a favourable growth rate but is inferior in quality having less meat and high fat content. Much effort has been made in improving carcass and meat quality by adding more LR

from Norway in 3-way crossbreds. The objective of this study was to compare the carcass and meat quality of pigs by increasing LR line from 25 to 62.5 %.

Materials and Methods

Fourteen finishing pigs with (D x (LR x LW)) at 50:25:25 and 26 (LR x (D x (LR x LW))) at 25:62.5:12.5 were kept on the same feed regime and same management conditions. They were fed from 30 kg body weight for a period of 110 days. All pigs were slaughtered at Chiang Mai Meat and Dairy Products Unit, Chiang Mai, Thailand. Carcass traits were studied according to Jaturasitha (2000). The meat pH (Model 191, Knick, D-Berlin), electric conductivity (EC, Model LF-196, WTW) and Color (Minolta Chroma Meter CR-300, Osaka, Japan) were measured. Drip loss was also evaluated (Honikel, 1987). Cooking loss was assessed by boiling at 80°C until internal temperature had reached 72°C. Shear forces were obtained by the Instron apparatus (Model 5561) using the Warner-Blatzler device with 6 replicates per sample. Data were subjected to analysis using T-tests and the comparisons among means were carried out using the least significant difference test (LSD) with SPSS 9.0 for Windows.

Results and Discussion

Table 1 illustrates the effect of LR line on carcass quality. The live weight of 62.5 % LR was significantly ($P<0.05$) heavier than that of 25 % LR (111.15 vs 104.36 kg). The carcass weights of both groups were 84.21 and 78.48 kg, respectively. The heavier LR line tended to be more favourable than the lighter LR line even though there were no significant differences ($P>0.05$) in dressing percentage, carcass length, backfat thickness and lean meat percentage. These results are supported by the findings reported by Lo *et al*. (1992) and Sanboa *et al*. (1991).

Table 1. Carcass quality traits of the experimental pigs

Item	25% LR	SE.	62.5% LR	SE.	Sig.
Number of animals	26	-	14	-	-
Live weight (kg)	111.15 [a]	1.58	104.36 [b]	1.99	0.013
Carcass weight (kg)	84.21 [a]	1.33	78.48 [b]	1.30	0.008
Dressing percentage (%)	73.46	0.30	73.02	0.59	NS
Length (cm)	79.69	0.57	80.25	0.60	NS
Loin eye area (cm^2)	50.36	1.45	49.49	1.33	NS
Backfat thickness (cm)	2.54	0.08	2.60	0.08	NS
Lean meat (%)	58.42	0.42	57.42	0.41	NS

Values with different superscripts within each row differ significantly ($P < 0.05$);
SE = Standard error; LR = Landrace; Sig. = Significance.

Table 2 shows the results on indirect and direct meat quality traits. The pH-value and EC indicated no significant differences between the ratio of LR line. However, the heavier LR line tended to have a lower pH and higher EC than the lighter LR line because the LR would have more of the halothane gene (Chansawang, 1986). Redness (a*) of the lighter LR line was significantly different ($P<0.05$) from that of the heavier LR line. This higher value indicated that the lighter LR line would give darker meat compared to the heavier LR line even though they were at the same age. From a meat production perspective, LR can be included in cross-breeding programmes at 62.5 % with D and LW.

Table 2. Meat quality traits in experimental pigs

	25% LR	SE.	62.5% LR	SE.	Sig.
Number of animals	26	-	14	-	-
pH-value					
-45 min p.m. (ham)	6.30	0.06	6.40	0.06	NS
-45 min p.m. (loin)	6.34	0.07	6.38	0.08	NS
-24 hr p.m. (ham)	5.54	0.03	5.63	0.08	NS
-24 hr p.m. (loin)	5.55	0.03	5.57	0.06	NS
Conductivity					
-45 min p.m. (ham)	2.01	0.07	2.02	0.07	NS
-45 min p.m. (loin)	2.01	0.18	1.77	0.07	NS
-24 hr p.m. (ham)	2.81	0.28	2.34	0.28	NS
-24 hr p.m. (loin)	2.03 [a]	0.22	1.55 [b]	0.08	0.046
Color, 48 hour p.m.					
-Luminosity (L∗)	53.99	0.5130	54.35	0.54	NS
-Red-Green index (a∗)	7.37[b]	0.3498	8.53[a]	0.32	0.036
-Yellow-Blue index (b∗)	2.62	0.5167	1.59	0.49	NS
WHC %					
-Drip loss	4.92	0.45	5.94	0.85	NS
-Thaw loss	8.8	0.52	8.56	0.84	NS
-Cook loss	26.06	0.50	25.18	0.68	NS
Shear force					
-Maximum force (N)	60.99	3.21	62.71	4.51	NS
-Total energy (J)	0.34	0.03	0.40	0.04	NS
-Extension (mm)	16.77	0.11	16.79	0.25	NS

Values with different superscripts within each row differ significantly (P < 0.05);
SE = Standard error; LR = Landrace; Sig. = Significance; p.m. = post mortem.

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