ABSTRACT

The objectives of this study were to study the influence of beef production systems and ageing period on meat quality by determining pH values, colour of meat, Warner Bratzler shear force (WBSF), and intensity of troponin-T degradation.

Beef samples were taken from carcasses of cattle produced from 5 different production systems as follows: 1) Charolais crossbred (50% Charolais x 25% Brahman x 25% native Thai), weighed 500-600 Kg, aged 2½ yr, fed with TMR and grasses for 8 to 10-mo (KU; n=10); 2) at least 50% Charolais crossbred steers, weighed 600-700 Kg, aged 3½ yr, fed with grasses and/or rice straws, supplemented with concentrate for 12 to 18-mo, and molasses was added in the ration after 4-mo of fattening (TF; n=5); 3) high-blood Brahman crossbred steers, weighed 450-500 Kg, aged 3 yr, fed with grasses and/or rice straws, and supplemented with concentrate for 3-mo (BG; n=10); 4) high-blood Brahman crossbred steers, weighed 460-600 Kg, aged 3 yr, fed with pineapple byproducts, and supplemented with concentrate for 6-mo (BP; n=10); and 5) native Thai cattle, weighed 180-250 Kg, aged 2 yr, and freely grazed natural forage (TN; n=10).

Cattle from each group was slaughtered at different abattoirs. Longissimus dorsi (LD) muscles between the 6th and the 12th rib were taken from left side of carcasses and transferred to at KMITL laboratory. After 24 hr postmortem storage at 0-4 °C, LD muscles were cut into three 7.5-cm thick steaks and assigned for 1, 7, or 14 days ageing at 0-4 °C. The pH values, colour of meat (L*, a*, and
b*), WBSF and troponin-T degradation were determined at each ageing period. All data were statistically determined according to 5 (beef production systems) x 3 (ageing period) factorial arrangement in completely randomized design.

Results revealed that beef production systems had effects on pH values, colour of meat, WBSF and intensities of troponin-T1 (Tn-T1; 39 kDa), troponin-T2 (Tn-T2; 37 kDa) and troponin-T_{product} (Tn-T_{product}; 30 kDa). Beef from TN group had higher (p<0.05) pH values than those from KU, BG and BP groups, but did not (p>0.05) differ from those of BG. TF, BP, and TN had similar (p>0.05) lightness values, but were lighter (higher L*, p<0.05) than KU and BG. TF group was the reddest (highest a*, p<0.05). TN and KU were similarly red (p>0.05), but were less red (p<0.05) than BP, BG, and TF, respectively. Beef from KU, BG, and BP were similarly yellow (p>0.05), but were less (p<0.05) yellow than TF and more (p<0.05) yellow than TN. Compared to all, TF had the lowest WBSF (most tender, p<0.05). BG and TN had similar (p>0.05) WBSF values, but were higher (less tender, p<0.05) than those of BP and KU, respectively. Tn-T1 band (39 kDa) of BG beef had the highest (p<0.05) intensity. KU beef had similar (p>0.05) Tn-T1 band intensity to TF, but was less (p<0.05) than those of BP and TN. The intensities of Tn-T2 band (37 kDa) in BG and TN were similar (p>0.05), but were higher (p<0.05) than those of BP, KU, and TF, respectively. TN and BG had similar (p>0.05) Tn-T_{product} (30 kDa) intensities, which were higher (p<0.05) than those of KU, TF, and BP.

Ageing period had effects on meat colour, WBSF and intensities of Tn-T1, Tn-T2 and Tn-T_{product} but did not affect pH values.

In all beef production systems, WBSF was (p<0.01) positively correlated to Tn-T1, Tn-T2, but negatively correlated to Tn-T_{product} intensities.