CARCASS TRAITS DETERMINING QUALITY AND YIELD GRADES OF KOREAN NATIVE BEEF

Moon, Seong-Sil[2], Hwang, In-Ho[3], Joo, Seon-Tea[1], Park, Gu-Boo[1]
Meat Science Laboratory,[1] Division of Animal Science, Gyeongsang National University, Chinju 660-701, Korea
[2]Animal Products Grading Service, 424-6 Dang-dong, Gunpo Kyunggi-do, Korea
[3]National Livestock Research Institute, 564 Omokchun-dong, Suwon Kyunggi-do, Korea

Background

Marbling is a prime theme in Korean beef industry, as consumers judge meat quality on the basis of the degree of marbling, and they are willing to pay premium for highly marbled product (APGS report, 2001). Under the market circumstance, carcass quality is largely determined by marbling score (Park et al., 2002), and consequently breeders and producers have forced on improvement of marbling. Retail carcass price is a sum of quality and yield grades, and back fat thickness negatively affects yield grade. In this regard, it is important to determine optimum growth performance and feeding period for better marbling with less back fat. Furthermore, it is also necessary to understand the relative importance of carcass traits and their interactions determining quality and yield grades.

Objectives

The current study was conducted to determine the effect of slaughter weight on carcass traits, quality grade and yield grade.

Methods

A group of Korean Hanwoo steers (n = 14.386) was sampled from a commercial arbattoir located in Seoul province over one year period (spring, summer, fall and winter) and their carcass traits were collected. Majority of the steers was approximately 24 months of age. Carcass was classified into one of four quality grades (1+, 1, 2 or 3) and one of three yield grades (A, B or C). Quality grade was primarily determined by marbling score and additionally adjusted by other carcass traits such as meat color, fat color, texture and maturity when there was a particular defect in these traits (APGS, 1995). Yield grade was determined on the basis of estimated retail cut percentage, which was a function of back fat thickness, ribeye area and cold carcass weight (APGS, 1995).
Regression coefficients for quality grade as a function of marbling, meat color, fat color, texture and maturity were determined by a multi-regression procedure (SAS, 1999) and partial coefficients of determination were estimated by applying a stepwise selection. The regression coefficients for yield grade as a function of back fat thickness, ribeye area and carcass weight were also estimated by the same model.

Results and Discussion

The result showed that back fat thickness linearly increased as slaughter weight increased up to 760 kg (Figure 1). There was a weak curvilinear relationship between marbling score and live weight. Boleman et al. (1998) reported that marbling score was dramatically increased from 227 to 454 kg. The current result was also consistent with early studies (Duckett et al., 1993; Short et al., 1999). The latter study showed a fast linear increase up on 18 months and a little subsequent change with time on feed. In this study, marbling score linearly increased up to approximately 570 kg of slaughter weight and thereafter almost reached its asymptotic level. The result indicated that extended feeding over 570 kg provided a little benefit on quality grade, whereas the increased back fat had negative influence on yield grade. Our early study in Hanwoo (Park et al., 2002) also demonstrated that slaughter weight above 550 kg did not affect marbling score. Changes in texture score had a curvilinear relationship with slaughter weight where the score linearly decreased up to approximately 570 kg, and the rate was little changed beyond approximately 570 kg (Figure 2). This relationship was in a similar with that observed between marbling score and slaughter weight. This may be an indication that improvement in texture was associated with the improved marbling and the subjective meat texture reflected degree of marbling to some extent. As shown by Short et al. (1999), ribeye area linearly increased as slaughter increased (Figure 2). Figure 3 shows quality and yield grade as a function of slaughter weight. A quadratic relationship indicated that slaughter weight approximately higher than 590 kg had a little benefit on quality grade, whereas yield grade decreased beyond approximately 510 kg. Paisley et al. (1999) reported that the benefit of the increased weight may be offset by other detrimental aspects such as maturity, nutrition and management practices. In Korea grading and retailing systems, quality and yield grades determine retail carcass price to a similar extent. On the basis of the current result, approximately 550 kg at 24 months appears to be the optimum growth rate and slaughter weight in a point of economic benefit.

Conclusions

Linear increase in marbling score was completed by approximately 570 kg of slaughter weight, while back fat thickness and ribeye area linearly increased until 750 kg. The data indicated that 570 – 590 kg of live weight at the age of 24 months was the optimum growth performance and slaughter age for producing the best quality grade. The data also suggested that approximately 550 kg at 24 months appeared to be the optimum growth rate and slaughter weight in Hanwoo steer.

Pertinent literature

Animal products grading service. 1995. Report of business for animal products grading.
Animal products grading service. 2000. Report of business for animal products grading.
Boleman, S. L., Boleman, S. J., Morgan, W. W., Hale, D. S., Griffin, D. B., Savell, J. W., Ames, R. P., Smith, M. T., Tatum, J. D., Field, T. G., Smith, G. C., Gardner, B. A., Morgan, J. B., Northcutt, S. L., Dolezal, H. G., & Ray, F. K. 1998. *Journal of Animal Science, 76,* 96-103.
Duckett, S. K., Wagner, D. G., Yates, L. D., & May, S. G. (1993). *Journal of Animal Science, 71,* 2079-2088.
Paisley, S. I., Horn, G. W., Ackerman, C. J., Gardner, B. A., & Secrist, D. S. 1999. *Journal of Animal Science, 77,* 291-299.
Park, G. B., Moon, S. S., Koh, Y. D., Ha, J. K., Jang, H. H., & Joo, S. T. 2002. 129-136.
Savell, J. W., Cross, H. R., Francis, J. J., Wise, J. W., Hale, D. S., Wilkes, D. L., & Smith, G. C. 1989. *Journal Food Quality,* 12, 251.
Short, R. E., Grings, E. E., MacNeil, M. D., Heitschmidt, R. K., Williams, C. B., & Bennett, G. L. 1999. *Journal of Animal Science, 77,* 2406-2417.

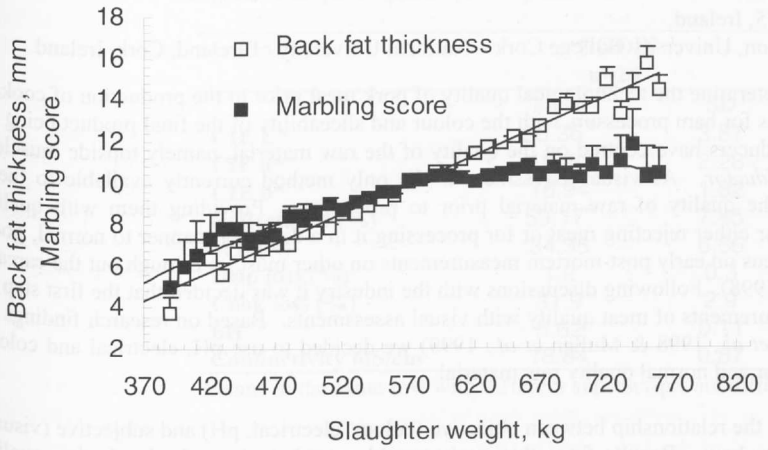

Figure 1. Marbling score and back fat thickness as a function of slaughter weight.

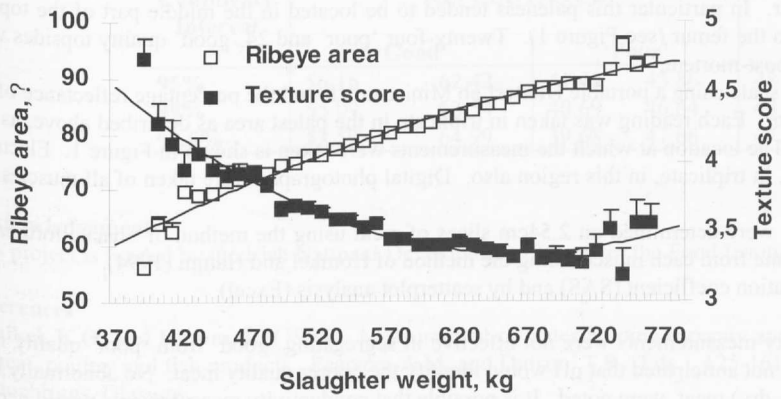

Figure. 2. Ribeye area and texture score as a function of slaughter weight.

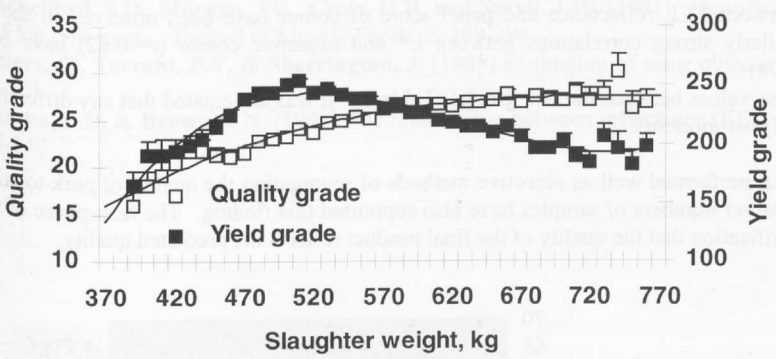

Figure 3. Quality and yield grades as a function of slaughter weight.