

Meat Performance of Chinese Yellow Cattle

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Background

In China, Yellow Cattle are the most important cattle accounting for 80% of the Bos family. For a long time, the uses of Yellow Cattle were for animal power, that is, plowing land, pulling carts, or carrying loads. Its slaughter rate had been very low, ranging from 6 to 7% from 1950 to 1980. Besides pasture areas where some of the cattle could be used as beef, in most area, only very old cattle were allowed be slaughtered for meat purposes (Zhou, 1998). So beef was particularly rare during that period, though other meats were also short in supply. Since 1981, when the restriction on slaughtering of cattle was abolished, more and more Yellow Cattle have been used for meat. Beef production has enjoyed a fast development for the last 20 years. Beef yield increased from 540 thousand ton in 1980 to 5000 thousand ton in 1998, while the proportion of the beef among total meat has risen to 8% from only 2% in the early 1980's (China Agriculture Yearbook, 1980 and 1998). Beef production is becoming a new livestock industry in China.

As the development of the beef industry, the growth performance and meat quality of Yellow Cattle has never been given such emphasis before. Various crossbreeding programs were implemented nationwide, using imported beef breeds to improve Yellow Cattle's growth rate and body size. Different fattening systems were tried according local conditions to promote cattle's daily weight gain and dressing percentage. The aging processing, which was a new concept for most people working in the industry in China, were introduced and adopted in some slaughterhouses to upgrade meet quality (Liu and Zhou, 1998). Although a great achievement has been made in past decades by adapting relevant concepts of beef production into the industry, as a new livestock industry in China, beef production still lacks an integrated system. A key link missing in the chain is the beef grading system that have been proved successfully for promoting beef industry in many countries (Zhou and Liu, 1997). Therefore, it is necessary to establish a beef grading system in China.

Objective

Current investigation on the meat performance of Yellow Cattle was aimed to identify the distribution of important characteristics of beef performance and provide a basis for beef grading system establishing.

Methods

A total of 334 Yellow Cattle and other local breeds and its crossbreeds (with Simmental or Limousin) were tested in six slaughterhouses. Prior to slaughtering, all cattle were weighed and their ages were judged from the dentition while breeds and sex were recorded at the same time.

The hot carcass was weighed after normal slaughtering processing including bleeding, head and feet removing, skinning, viscering, cleaving into two halves and cleaning. Then the carcass was transported into the aging room with the ambient temperature at 0~4°C for 7 days. The carcass was then splitted transversely at the 12~13 thoracic vertebra. On the cutting surface the longissimus muscle area was measured by drawing its outline on the sulfate paper and then measured using a plamimeter. Back fat thickness was measured vertically to the out surface at the 3/4 length of the ribeye from the side near to the vertebra according to Meat Evaluation Hand Book(USDA, 1997).

All the data were statistically analyzed by using statistic program of spss 8.0. The mean, coefficient of variance, standard deviation was shown besides the chart and the program consequently drew the frequency distribution and the normal curve.

Results and discussions

The distribution of cattle's slaughtering age is shown in the Figure (a). There were two characteristics regarding to the age: first of all it was widely diversified, from only 1 year old to as old as 10 and the coefficient of variation is 45.23. Secondly, cattle were relatively old, about half of total cattle were over 5 years old when they were slaughtered. The following reasons might explain this phenomena. Firstly, some cattle had been used as the animal power in the countryside before they were sold, so they turned to be quiet old animals when they were slaughtered. Secondly, most cattle were fed in the countryside by individual families commonly with the size of one to three, instead of fed in large size feedlot. How old when cattle to be sold depends on the family's economic situation that were different from one family to another, so the diversities in cattle's age would be expected. Poor feeding was an another reason for the relative old age. In the most countryside cattle were mainly fed with the roughage such as straws and grass, and hardly any concentrates were added. So it took a long time for cattle to reach a

reasonable weight. However, situation is improving in some areas in China as large feedlots were set to fatten cattle together before selling to the slaughterhouse. Cattle slaughtered at a relative younger age is becoming popular for in that case the beef become much tender and welcomed by consumers (Liu and Zhou, 1998).

As shown in the Figure (b) that the average cattle's live weight was around 530 kg, varied from the lowest of 348.5 kg to the highest of 751 kg. The coefficient of variation is 14.16 that reflect the uniformity of live weight distribution, which coincides closely with normal distribution on the whole. The most of cattle's weight varied from 400kg to 680kg, which differ from age distribution, neither very small nor very big. In practice, the slaughterhouse would hardly accept cattle that were too small, for instance below 400 kg. That is why cattle's live weight was not widely diversified, as its age tended to be.

The distribution of cattle's carcass weight and dressing percentage are shown in the Figure (c) and (d) respectively. The average carcass weight and dressing percentage were 283.9kg and 53.8% respectively. Dressing percentage was a decisive index for the value of live cattle. In most slaughterhouses in China set the dressing percentage of 52% as a standard. In practice, the price decreased or increased about 0.3¥/kg for each percentage lower or higher.

As shown in Figure (e), the thickness of back fat varied so much that some were virtually none and a few was above 4 cm. Accordingly, the coefficient was as high as 56.69 that reflecting a great diversity. The mean value of the back fat thickness was 1.4 cm and most of them were below 2cm. The extensive deposition of back fat in cattle occurs during its late growth period on the condition the enough energy in the feed is supplied. As explained in the above, the most of cattle in China were raised in the countryside by individual family. The feed available for cattle was mainly roughage and hardly any concentrate was used. So cattle were generally under poor feeding condition regarding to the standard of beef production, that is why most of cattle slaughtered without much fat deposition. Cattle's back fat was critical important in commercial practice in some area in China. Only those cattle with certain amount back fat deposition could be sold at a good price because that the beef cut with a fair marbling and a bit of fat deposited either inside or outside of muscles were preferred by consumers.

The mean, minimum and maximum of Longissimus muscle (LM) area are shown in Figure (f). The average LM area was 62.96 cm², most of the values distributed between 50 to 70 cm². Compared with foreign beef that generally having a LM area above 75 cm² (May, 1994), Chinese Yellow Cattle and its crossbreeds had a relatively small Longissimus muscle. As mentioned before Yellow Cattle used to be a draught livestock, its muscle in middle and hindquarters were not as thick as meat type cattle beef. Another reason for this was the feeding condition that limited muscle's fully development.

Conclusion

It is concluded that cattle in China were slaughtered at a relatively old age and widely distributed from only 1 year old to as old as 9 years old. Cattle's live weight, dressing percentage, longissimus muscle area and back fat thickness varies due to the different feeding systems. Although Yellow Cattle and its crossbreeds could perform well in both meat yield and meat quality after a certain period of fattening (Jiang, 1996), cattle in China were generally poor fed. Consequently, it took a long feeding period for cattle to reach a reasonable slaughtering weight and a large amount of them had not even well developed regarding to the muscle and fat deposition. Another problem refer to the beef industry in China was lacking a standard system to grade beef in both quality and yield. So improving the feeding condition and establishing a beef grading system is very urgent and important to China's beef industry.

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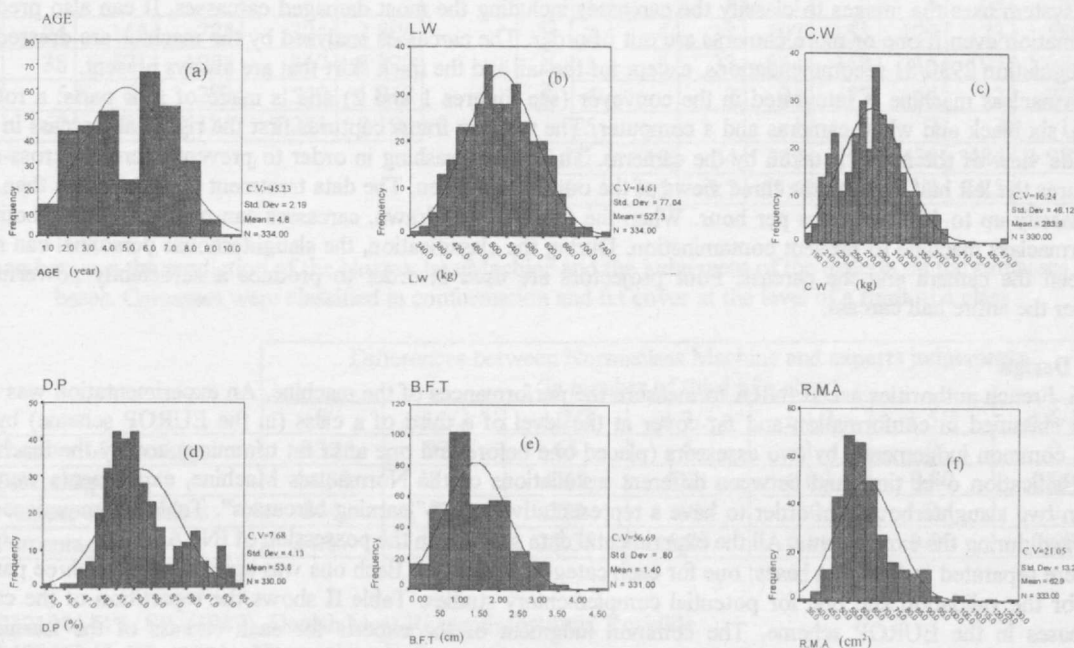


Figure: Distributions of the age (a), live weight (b), carcass weight (c), dressing percentage(d), fat thickness (e) and longissimus muscle area (f) of Yellow Cattle and its crossbreeds.