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Marbling standards for beef and pork carcasses

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Contents

Importance of marbling

The small flecks of intramuscular fat or marbling present in the high-priced cuts (loins and ribs) of beef and pork have long been known to influence the eating quality of meat. However, until now no Canadian standards existed for marbling in beef or pork carcasses.

In recent Canadian studies, beef with small amounts of marbling generally had improved tenderness and taste over meat with trace levels or no marbling. Consumers, however, are selecting meat with low levels of visible fat as they become concerned about animal fat in the human diet. Marbling is not presently assessed in carcass grading procedures and consequently retail cuts of meat contain variable levels of marbling.

These standards are designed for use in research studies, for carcass grading, and for consumers who wish to make more informed purchasing decisions about meat. Marbling will likely be assessed as part of grading procedures in the near future.

Variation in marbling

The degree of visible marbling is described in terms of the approximate percentage of intramuscular chemical fat present as follows:

- devoid 1.0–2.5%
- trace 2.5–4.0%
- slight 4.0–5.0%
- small 5.0–6.5%
- modest 6.5–7.5%
- moderate 7.5–8.5%
- abundant >8.5%

Recent Canadian surveys have defined the variation in marbling in both beef and pork.

Beef

The current variation in marbling for beef carcasses occurs as about 1% devoid, 20% trace, 60% slight, and 19% small or greater. Therefore, most high-priced meat cuts sold at retail now have slight marbling.

Pork

For pork, the current variation in marbling occurs as about 23% devoid, 67% trace, 9% slight, and 1% small or greater. Marbling in pork is less easy to see because of the pale color of the meat, but the most common cuts sold at retail show traces of marbling.

Assessment of marbling

For research studies and carcass grading procedures, marbling must be assessed under standardized conditions. Use the surface of freshly cut

muscle, which has been exposed to air for at least 15 min. Ensure a lighting intensity at the meat surface of at least 100 lx from an incandescent light source.

The assessment of marbling requires judgment because several variables will influence the final score. Marbling can be coarse (large deposits of fat) or fine (small flecks of fat). Its distribution may be even (covers all the muscle) or uneven (covers part of the muscle). Overall marbling score takes into account each of these factors (size, number, and distribution of particles), i.e., large pieces of fat receive only slightly more credit than small or fine pieces. Large pieces touching the outside fat receive no credit. Electrical stimulation in beef carcasses generally enhances the marbling score, particularly if assessment is done within 24 h of slaughter.

The illustrations for beef (Plate I *a*–*d*) and pork (Plate II *a*–*e*) depict the minimum level of marbling for the standard. The surface of the muscle to be assessed for marbling is compared to the photographic standard. Generally, the marbling score is decided through choice of the photographic standard that has a slightly lower amount of marbling than the sample. In borderline cases where the muscle sample appears to meet the minimum requirements for a particular marbling level, the size and distribution of the marbling particles are taken into account. Large coarse deposits of marbling or an uneven distribution of marbling for borderline cases usually result in a marbling score in the next lower level, i.e., from small to slight or slight to trace.

Genetics and marbling

There is general belief that marbling is associated with high levels of carcass fat. Recent studies in both beef and pork show that subcutaneous fat accounts for only about 1–5% of the variation in marbling. Therefore, if an animal has a genetic predisposition for a low capacity to deposit intramuscular fat, no amount of high-energy feeding prior to slaughter will increase the marbling score.

Because all breeds have genetic variation in marbling, selection can be used to change the levels of marbling. Japanese producers have used this strategy for many years to increase marbling in the Japanese Black cattle through progeny testing for the Kobe-style market. In North America, there is currently great interest in estimating the degree of marbling in live breeding animals using real-time ultrasound, but the techniques are not yet commercially available.

Calorie content of marbling

Although the chemical fat content of steaks increases along with the degree of visible marbling, the implications for calorie intake from this fat are relatively minor. For example, a 100-gm steak (cooked weight) with slight marbling would have approximately 63 cal from fat, whereas the same steak with small marbling would have 69 cal.

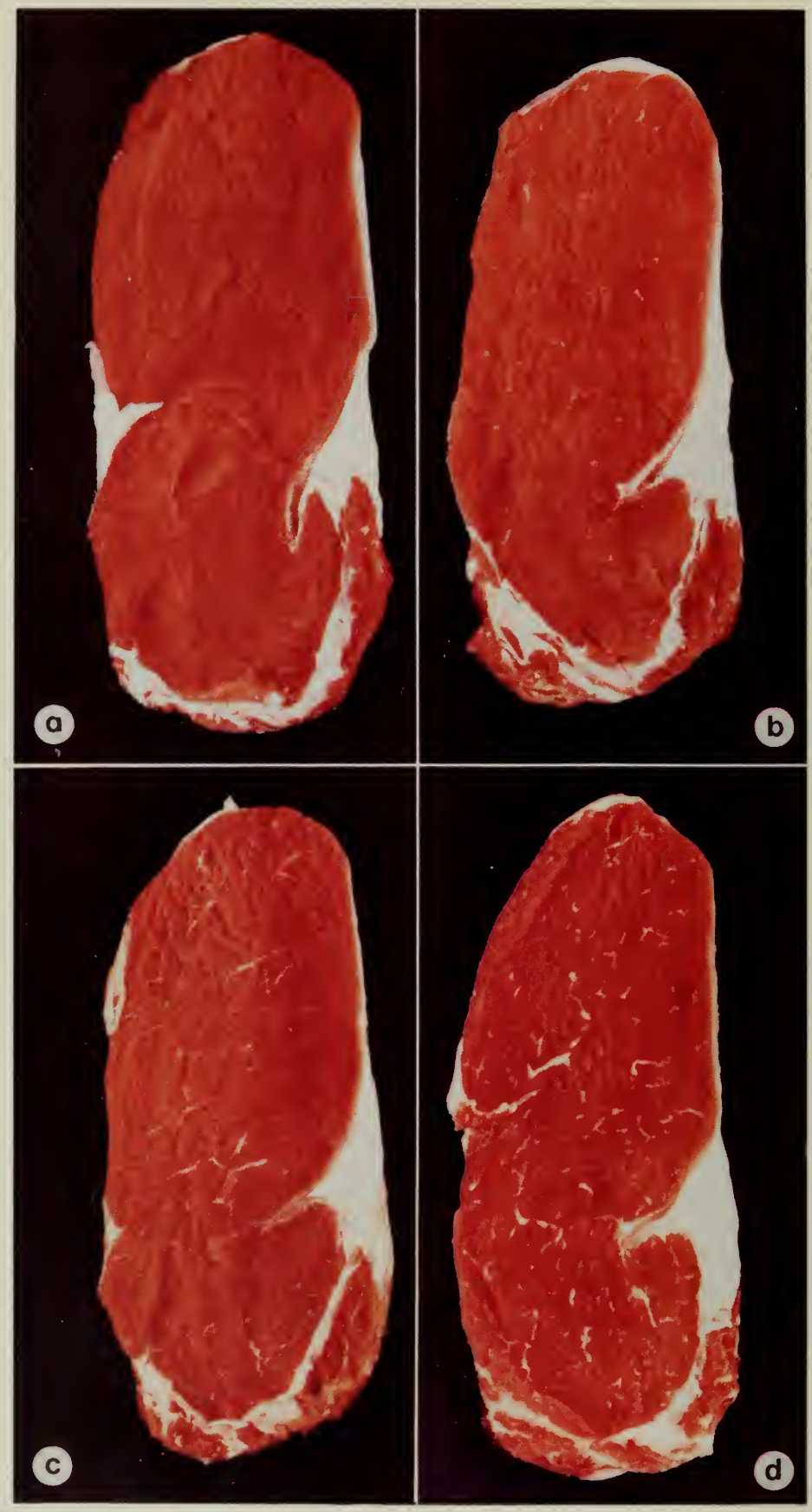

Plate I Marbling standard for beef rib-eye steaks cut at the 12th rib: *a* devoid, *b* trace, *c* slight, and *d* small.

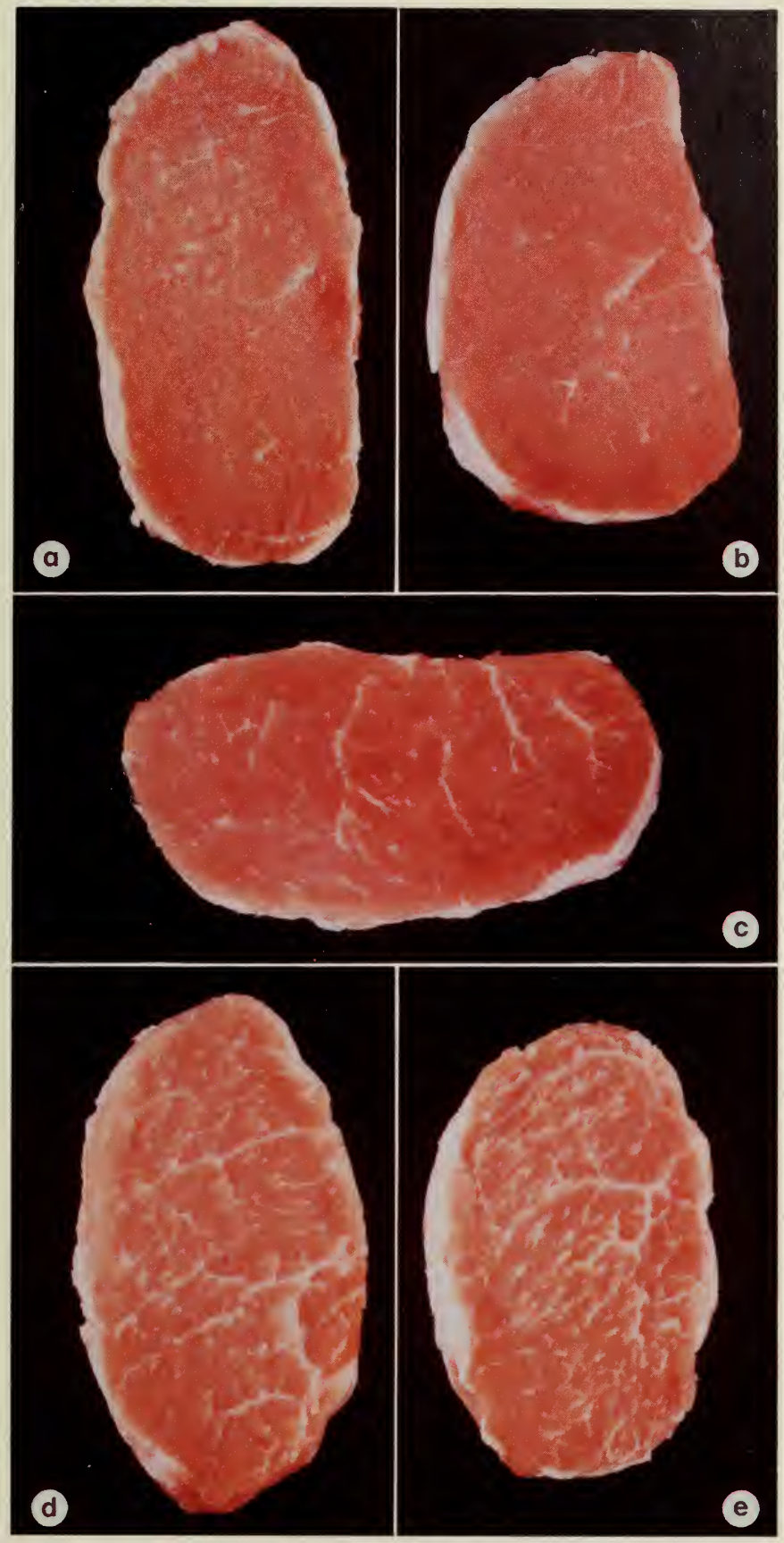

Plate II Marbling standard for pork steaks cut close to the 10th rib: *a* trace, *b* slight, *c* small, *d* moderate, and *e* abundant.