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# Pork Carcass and Live Slaughter Swine Grade Standards

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# Pork Carcass and Live Slaughter Swine Grade Standards

Great progress has been made in the production of meatier slaughter swine since the standards for pork carcass grade were last revised in 1968. The U.S. Department of Agriculture developed the official standards for slaughter barrows and gilts and their carcasses. The standards provide for segregation according to sex and grade which is determined by apparent excellence and desirability of the animal's particular use.

Sex differentiation refers to barrows as males castrated when young and before development of the secondary physical characteristics of a boar, stags as castrated males after development of secondary physical boar characteristics, boars as uncastrated after development of the secondary physical characteristics of a boar, gilts as young females that have not reached an advanced stage of pregnancy, and sows as mature females that show evidence of having reproduced or have reached an advanced stage of pregnancy.

Live slaughter grades of barrows and gilts are intended to be related directly to the grades of carcasses they produce. To accomplish this, slaughter barrows and gilts and their carcasses are evaluated on the basis of quality of lean and expected combined carcass yields of the four lean cuts (ham, loin, picnic shoulder, and Boston shoulder).

## CARCASS QUALITY

The two levels of quality considered for carcasses are acceptable or not acceptable. Acceptable pork carcasses have firm lean with adequate belly thickness to produce desirable bacon. The fat must be firm and free from any soft or oily condition.

In carcass grading, the quality of the lean is characterized by evaluating the color, firmness, and marbling of cut surfaces of major muscles such as the loin-eye muscle at the 10th rib. However, when this surface is not available, other exposed major muscle surfaces can be used to determine quality. When a muscle surface is not available, the quality of the lean will be evaluated indirectly, based on firmness of the fat and lean, amount of feathering between the ribs, and color of the lean.

Because quality measures are not directly evident in live animal grading, other factors are used to estimate quality. Those factors are amount and distribution of external finish, firmness of fat, and firmness of lean.

Carcasses or live animals that meet acceptable quality standards are graded U.S. No. 1, U.S. No. 2, U.S. No. 3, or U.S. No. 4. Slaughter barrows and gilts and their carcasses of unacceptable quality (with thin belly thickness or displaying soft, oily fat) are graded U.S. utility.

## CARCASS LEAN CUT YIELD

The carcass yield component of grading is based entirely on the expected combined four lean cut yields of ham, loin, picnic shoulder, and Boston shoulder (table 1).

**Table 1. Expected yields of the four lean cuts (ham, loin, picnic shoulder, and Boston shoulder) based on chilled carcass weight, by grade\***

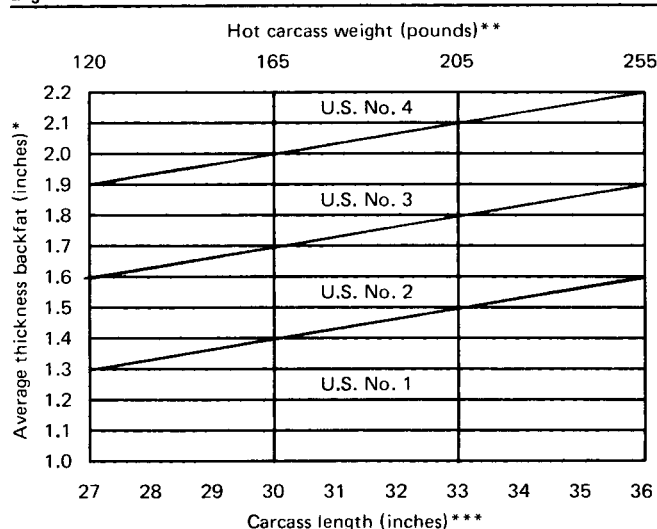
Grade	Percentage yield
U.S. No. 1 . . . . .	53 or more
U.S. No. 2 . . . . .	50 to 52.9
U.S. No. 3 . . . . .	47 to 49.9
U.S. No. 4 . . . . .	Less than 47

\*These yields will be approximately 1 percent lower if based on hot carcass weight.

Average backfat thickness relative to carcass length or weight is used as a guide to expected yields of the four lean cuts. Backfat thickness is an average measurement taken opposite the first rib, last rib, and last lumbar vertebra. Carcass length is measured from the anterior point of the aitch bone to the anterior edge of the first rib. Carcass weight rather than length can be used. However, if the grade differs by using carcass weight, the grade received by using length is used.

In carcass grading, the backfat thickness and carcass length or weight can be measured accurately to give the final carcass grade (figure 1).

**Figure 1. Relationship between average thickness of backfat, carcass length or weight, and grade for carcasses with muscling typical of their degree of fatness**



\*An average of three measurements (including the skin) made opposite the first and last ribs and the last lumbar vertebra. It also reflects adjustment, as appropriate, to compensate for variations from normal fat distribution.

\*\*Carcass weight is based on a hot packer style carcass, split into two sides, jowls and head attached, ham facing, and leaf fat removed.

\*\*\*Carcass length is measured from the anterior point of the aitch bone to the anterior edge of the first rib.

Live swine grading requires visual appraisal and evaluation of the expected backfat thickness and length or weight. In evaluating the average backfat thickness, parts of the animal and those points on the back where the backfat is measured should be considered. Very fat swine will be wider through the back than through the ham. As swine fatten, they become deeper in the flanks and underline. The jowl area becomes larger with more fullness. Variations in degree of fatness will have a greater effect on yield of lean cuts than does variation in muscle. Fatness and muscle usually are evaluated simultaneously. While the muscling of most swine develops uniformly, fat is deposited at a considerably faster rate as the animal reaches maturity. Therefore, muscle can be appraised best by evaluating the parts of the animal least affected by fatness, such as the ham. Although the lower ham and twist area is primarily fat, the area through the center ham or stifle area is least influenced.

Pork carcasses are classified into six degrees of muscling which can be evaluated in the live animal. These degrees of muscle (figure 2) are very thick, thick, moderately thick, slightly thin, thin, and very thin.

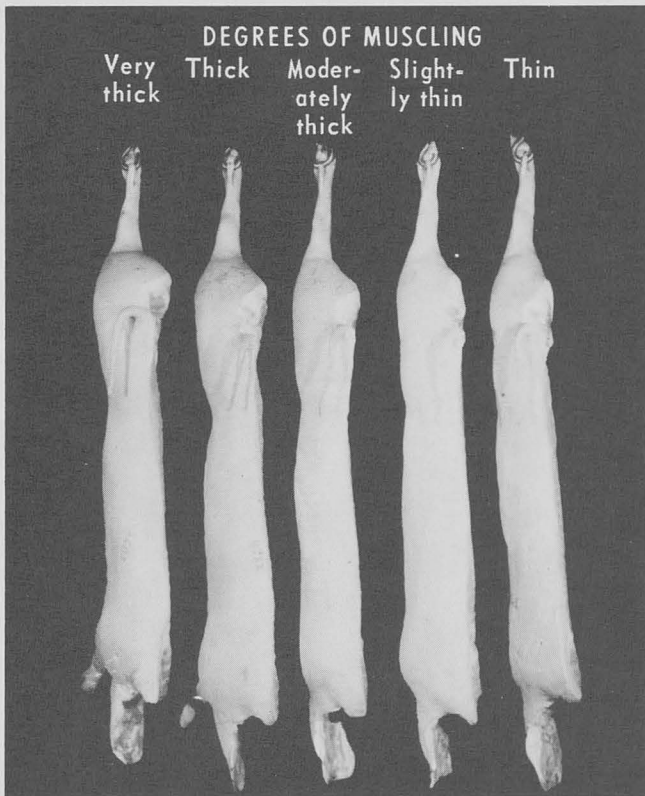


Figure 2. Five of six degrees of muscling are shown from very thick to thin. Differences in muscling are most obvious in the ham area and influence final carcass grade.

The minimum degrees specified as typical for barrows and gilts are U.S. No. 1, thick; U.S. No. 2, moderately thick; U.S. No. 3, slightly thin; and U.S. No. 4, thin.

When the development of muscling is different from that normally associated with its carcass degree of fatness, the average backfat thickness-carcass length or average backfat-carcass weight relationships for the various grades differ from those shown in figure 1. Unusual muscle development is considered within each grade. Superior muscling can compensate for greater fatness at the rate of one full degree of superior muscling for a 1/10 inch increase in average backfat. Except for the U.S. No. 1 grade, the reverse type of compensation is permitted and

at the same rate. In the U.S. No. 1 grade, compensation is limited to one full degree of inferior muscling, therefore, the U.S. No. 1 graded carcass is graded U.S. No. 2. In no case, however, may variations from normal muscling alter the final grade more than one full grade in either direction.

Since the majority of all slaughter swine are sold and purchased on a live basis, knowing the physical appearance which relates to the various carcass slaughter grades becomes basic in live animal evaluation. From the following figures and discussion you should be able to gain some insight about the general characteristics relating to each of the U.S.D.A. swine grade standards.

### U.S. No. 1

Barrows and gilts in this grade produce carcasses with acceptable lean quality and belly thickness with a high percentage (53 percent or more) of lean cuts. For carcasses with minimum acceptable lean quality, the cut surface of the loin-eye muscle at the 10th rib is slightly firm, slightly marbled, and has a grayish-pink to medium dark red color. For carcasses not separated at the 10th rib, acceptable quality of lean is indicated by a slight amount of feathering between the ribs and a grayish-pink to medium dark red color. The lean and fat are slightly firm. The belly is at least slightly thick (figure 3). These carcasses have less than 1.3 inches of backfat from average 200-pound slaughter swine.

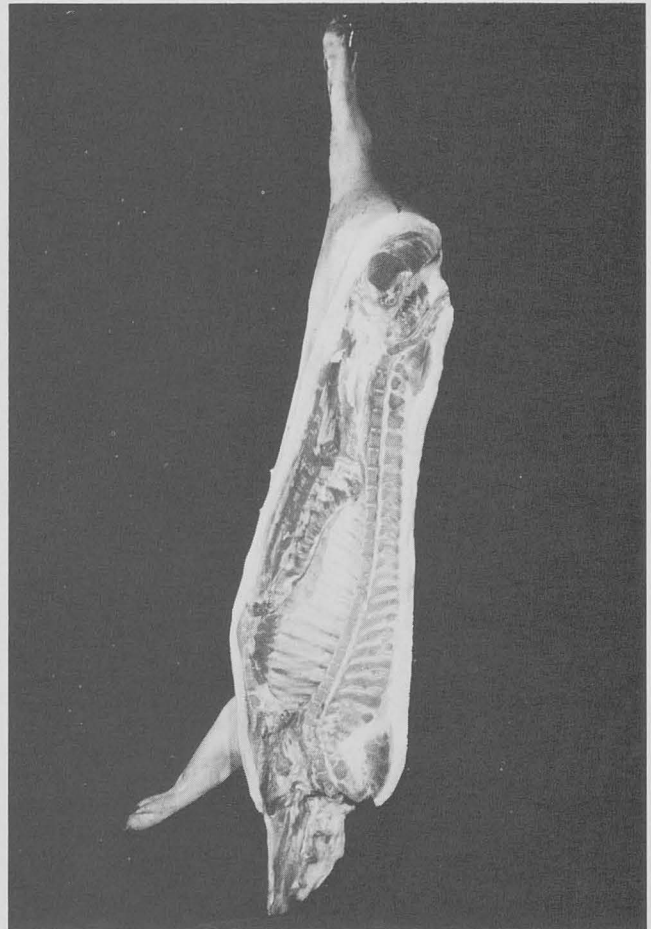


Figure 3. This U.S. No. 1 grade carcass is 30.5 inches long and has a maximum 1.3 inches of backfat with thick muscling. The ham and shoulders are expressively muscled with a minimum of fat cover.

Swine grading U.S. No. 1 are thickly muscled in the ham, loin, and shoulder. The ham is wider than the shoulder, and both are wider than the back. The back is lean and fully turned. The sides are moderately long and smooth. The rear flank is slightly full, and its depth is less than the depth of the fore flank. The jowls are firm and trim (figure 4).

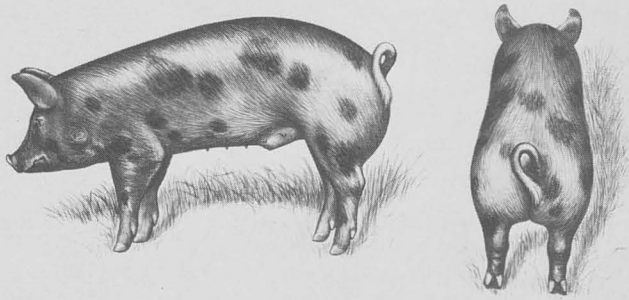


Figure 4. This U.S. No. 1 slaughter barrow is thickly muscled and has an average 1.2 inches backfat. The lower parts of the ham are trim and appear muscular. From the side, he is trim-middled but deep in his flanks. The jowls are clean and trim.

#### U.S. No. 2

U.S. No. 2 slaughter barrows and gilts in this grade produce carcasses with acceptable lean quality and belly thickness with 50 to 52.9 percent lean cuts (figure 5). These carcasses produced from average weight slaughter swine have between 1.3 and 1.6 inches average backfat.

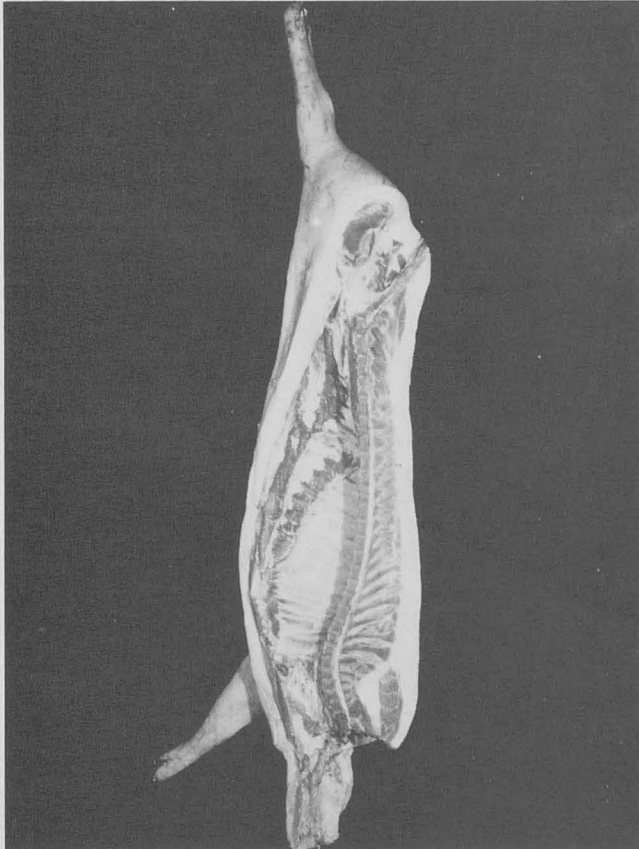


Figure 5. This U.S. No. 2 grade carcass is 29.5 inches long and has 1.6 inches backfat and moderately thick muscling. More fat is apparent in the ham and shoulder areas.

Swine in the U.S. No. 2 grade are moderately thick muscled in the ham, loin, and shoulders. The width through the shoulders is slightly more than the width through the ham. The sides are slightly short and smooth. The rear flank is moderately full, and its depth is slightly less than the depth of the fore flank. The jowls are moderately thick and full (figure 6).

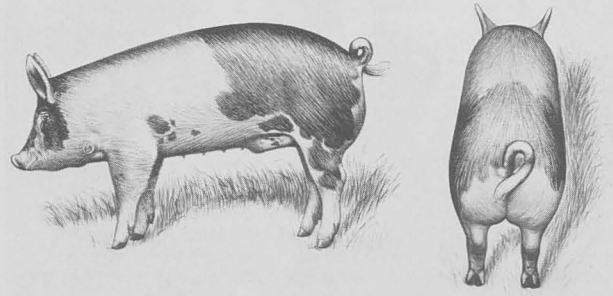


Figure 6. This U.S. No. 2 grade barrow has moderate muscle thickness through the ham and shoulder. The back appears uniform due to the added backfat thickness of 1.6 inches. From this side view, he is shorter-bodied with more waste in the areas of jowl, flank, and lower ham.

#### U.S. No. 3

Slaughter barrows and gilts in this grade produce carcasses with acceptable lean quality and belly thickness with a 47 to 49.9 percent lean of four lean cuts (figure 7). These carcasses

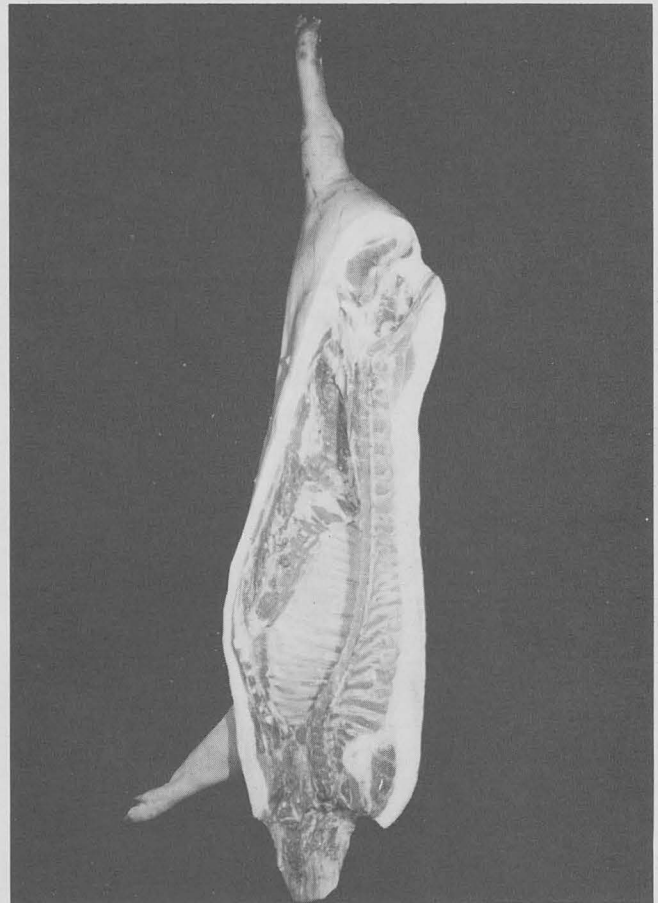


Figure 7. This U.S. No. 3 grade carcass is 30 inches long with an average 1.9 inches of backfat and slightly thin muscling. It appears uniform in thickness from the ham to the shoulder due to the added waste fat.

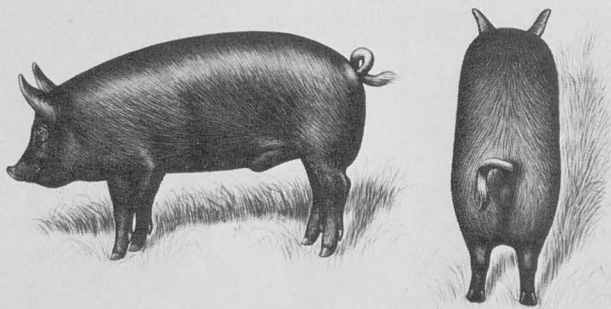


Figure 8. This U.S. No. 3 barrow has an average backfat thickness of 1.9 inches with slightly thin muscling. From the rear view the barrow's hams are flat with its legs set close behind. The back is nearly as thick as the hams and shoulder. From the side view, the barrow appears short-necked, deep and wasty-sided, early maturing, and refined in the bone structure.

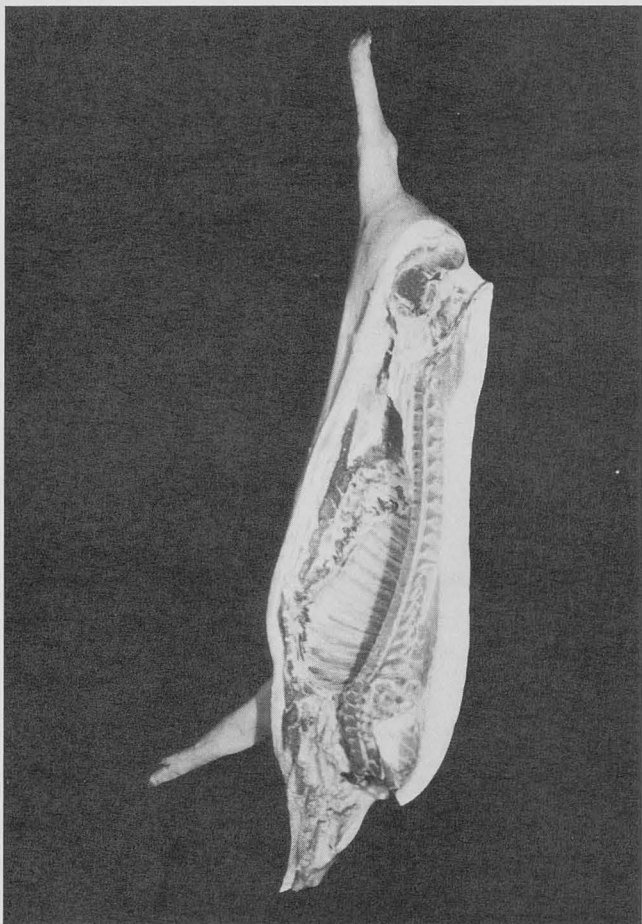


Figure 9. This U.S. No. 4 grade carcass is 28.5 inches long with 2.2 inches of backfat thickness. The loin and front portions of the carcass appear heavier and thicker than the ham. The ham is thin and flat-muscled.

Photos received from U.S.D.A.

have approximately 1.6 to 1.9 inches of backfat with slightly thin muscling, depending upon carcass weight and length. Fatter carcasses with thick muscling may grade U.S. No. 3.

U.S. No. 3 live swine are slightly thin in their muscling in the ham, loin, and shoulders. They are definitely wider through the shoulders than through the ham. Their backs display a right angle turn. The sides are short and smooth. The rear flank is full, and its depth is equal to the depth of the fore flank. The jowls are thick and full (figure 8).

#### U.S. No. 4

Swine graded U.S. No. 4 produce carcasses with acceptable lean quality and belly thickness with less than a 47 percent expected yield of lean cuts (figure 9). Excessively fat carcasses with more than 1.9 inches backfat and thin muscle are graded U.S. No. 4.

Live slaughter swine grading U.S. No. 4 appear fatter and less muscular than slaughter swine grading U.S. No. 3. Their body forms are very deep and wasty. The back is flat and wide with a right angle turn over the loin. These swine usually lack muscle and are small framed (figure 10).

#### U.S. Utility

Barrows and gilts in this grade are expected to produce carcasses with less than acceptable lean quality and/or unacceptable belly thickness. These swine have a thin covering of fat. The sides are wrinkled, and the flanks are shallow and thin (figure 11). These swine are very unthrifty in appearance.

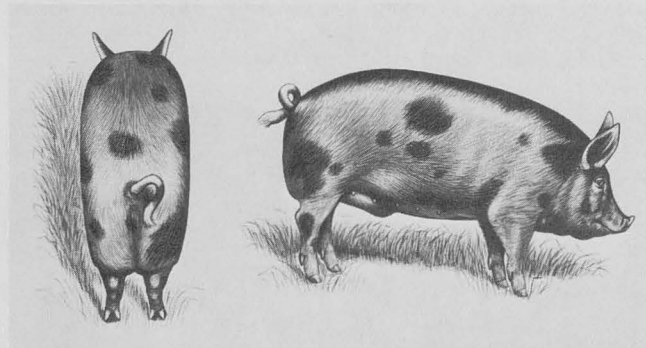


Figure 10. This U.S. No. 4 barrow has thin muscling and is excessive in his backfat thickness of 2.2 inches. From the rear view, he is wider over the loin than the hams and his legs are set very close. From the side view, he is short with excessive waste in the lower body cavity.

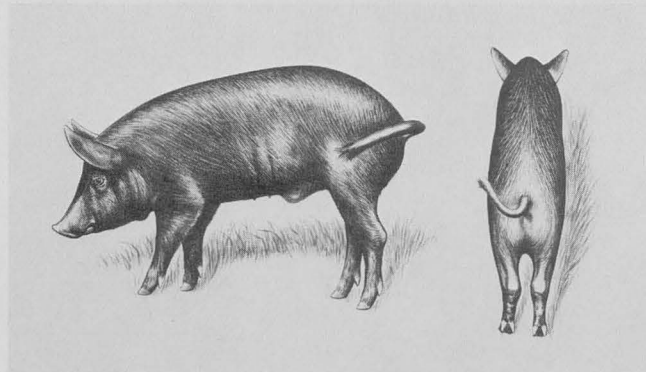


Figure 11. This U.S. Utility barrow will produce a carcass with unacceptable quality. The belly is too thin to produce acceptable bacon. He is very narrow and flat-muscled. From the side, he appears old and unthrifty with little muscle development.

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