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Dimensions of Livestock and Poultry

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Dimensions of Livestock and Poultry

Proposed by the ASAE Livestock Dimension and Configuration Factors Subcommittee; approved by the ASAE Structures and Environment Division Technical Committee; adopted by ASAE December 1968; reconfirmed December 1973; revised December 1978; reconfirmed December 1983, December 1984; revised March 1985; reconfirmed December 1989; reaffirmed December 1994, December 1995, December 1996, December 1997, December 1998, December 1999, January 2001, February 2006; revised editorially February 2006; reaffirmed January 2011; reaffirmed December 2015.

Keywords: Livestock, Poultry

1 Purpose and scope

1.1 The purpose of these Data is to provide information for use in the design of buildings and equipment for livestock and poultry. Summaries of available information are presented in the form of tables and curves of weight versus age and physical dimensions versus weight for various classes of livestock and poultry.

2 Beef

2.1 Average weight versus age for 68 steers of mixed European beef breeds is shown in Figure 1. The steers were used to provide the dimensional data in paragraph 2.2. The regression equation for Figure 1 is

$$WT = 15.33 + 0.8233\,(AGE) + 0.0001805\,(AGE)^2$$

where

WT = weight in kg

AGE = animal age in days

Percent error = 18.8

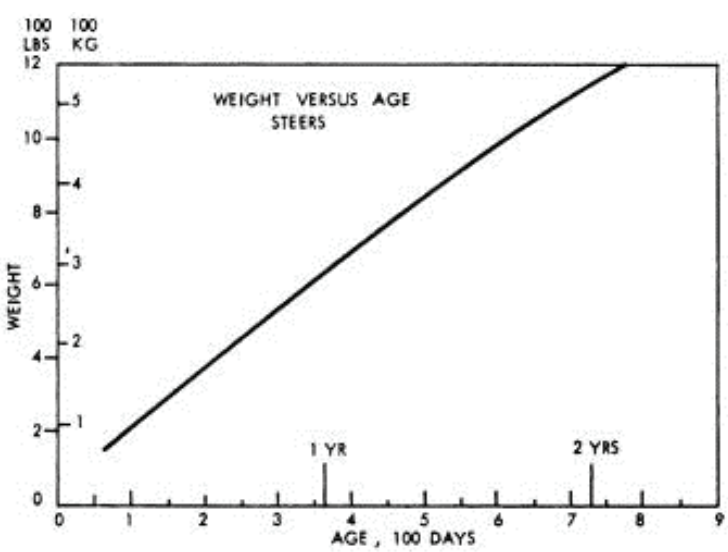

Figure 1 – Weight versus age for steers of European breeds

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Cross breeding, creep feeding, and other management practices produce greater weight gains than shown in Figure 1. Table 1 shows the average weight at specific ages for calves from matings of Hereford and Angus dams to Hereford, Angus, Jersey, South Devon, Limousin, Charolais and Simmental sires. From 62 to 399 animals were observed for each average. After weaning and preconditioning, the steers received diethylstilbestrol implants and were fed a ration of 60% corn silage, 33% grain concentrate and 7% protein supplement. The heifers were fed 50% corn silage and 50% grass haylage, with supplemental protein and minerals. The heifers were bred at 430 days of age or later. Growth curves for the steers during the feeding period, beginning at 225 days of age, are shown in Figure 2.

Table 1 – Weight of beef calves at specific ages, (kg)

	All Calves		Steers		Heifers	
	Birth Weight	Weaning Weight	180-day Feeding Period			
Breed Group*	0 days	215 days	225 days	405 days	400 days	550 days
HH	34.7	182	214	419	262	306
AA	31.0	190	225	420	275	306
HAx	33.7	194	230	430	286	325
Jx	29.4	183	221	408	255	298
SDx	35.8	194	227	443	296	337
Lx	36.2	197	233	428	291	324
Cx	38.6	207	246	470	305	344
Sx	38.0	204	239	463	305	349

* H=Hereford, A=Angus, J=Jersey, SD=South Devon, L=Limousin, C=Charolais, S=Simmental, HA=Hereford sires by Angus dams; HAx=HA+AH, Jx=JH+JA, etc

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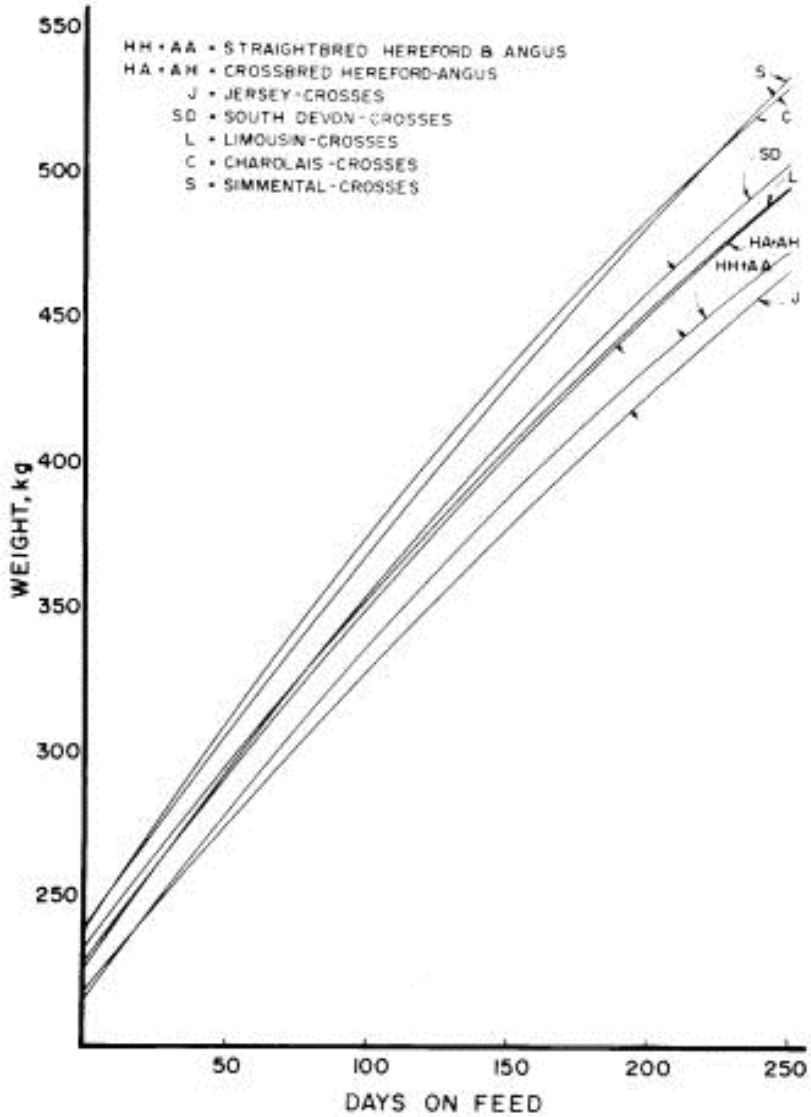

Figure 2 – Weight of crossbred steers on feed beginning at 225 days of age

2.2 Physical dimensions versus weight for 68 steers of mixed European beef breeds are shown in Figure 3 and Table 2. The regression equations for the curves in Figure 3 are given by

$$DIM = 10\left[A + B(WT) - C(WT)^2\right]$$

where

DIM = dimension in mm

WT = weight in kg

A, B, and C = constants listed in Table 2.

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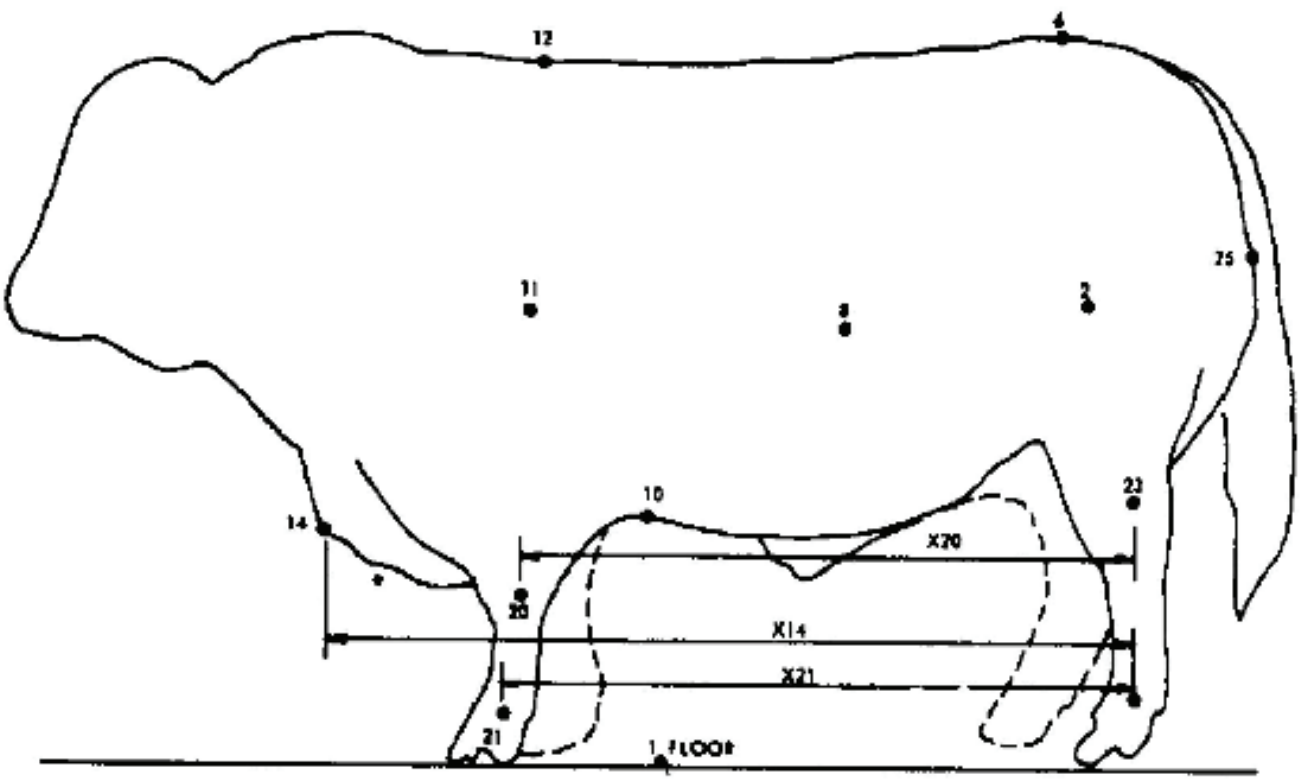
The reference points for Figure 3 are defined by:

Point	Description
25	Length coordinate, $X = 0$, rear tangent of the animal
1	Height coordinate, $Y = 0$ Floor
12	Thickness coordinate; $Z = 0$ center of back over shoulder; X coordinate not definite
2	Thickest point of hindquarter
6	Center of back above hindquarter; X coordinate not meaningful
8	Bulge of the belly
10	Bottom of chest highest above ground
11	Thickest point of shoulder
14	Pronounced break in the brisket; not accurately located
20	Center of foreleg at knee
21	Center of foreleg at dewclaw
22	Center of rear leg at dewclaw
23	Center of rear leg at hock



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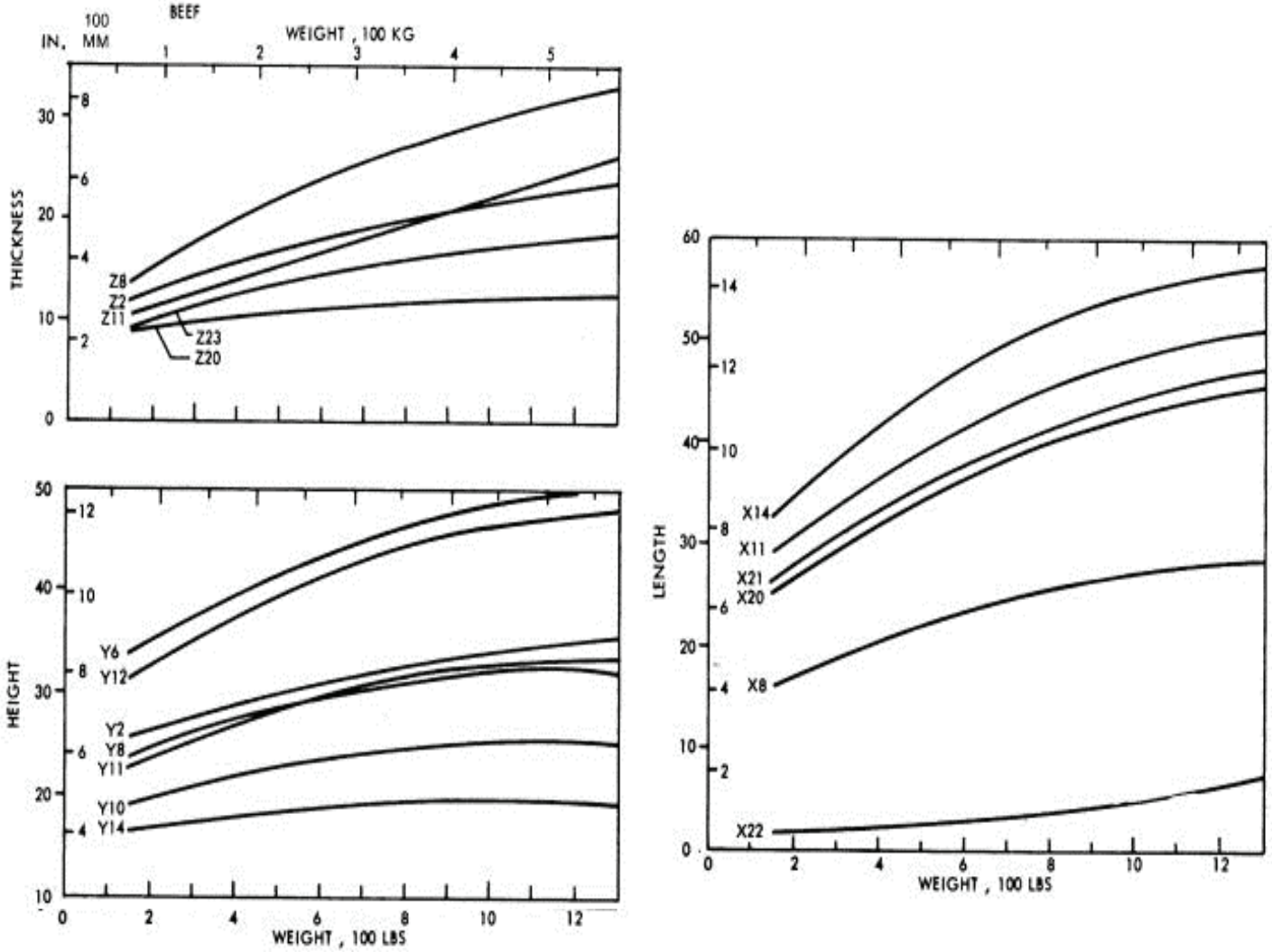

Figure 3 – Physical dimensions versus weight of steers

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Table 2 – Constants for regression equations

Dimensions	A	B	$C \times 10^6$	Percent Error
X				
8	32.67	0.1241	96.66	5.2
11	60.38	0.2098	156.78	3.7
12	57.30	0.1836	132.83	4.2
14	67.44	0.2466	193.57	13.9
20	52.11	0.1850	132.09	5.8
21	54.97	0.1864	129.25	21.0
22	4.62	0.0007	37.78	33.1
Y				
2	59.58	0.0842	56.66	6.7
6	75.01	0.1629	128.39	3.7
8	52.66	0.1079	90.86	6.1
10	43.19	0.0796	76.66	6.9
11	50.27	0.1211	116.04	6.6
12	68.51	0.1678	131.47	4.7
14	35.85	0.0620	69.01	10.9
Z				
2	24.17	0.0955	61.48	23.2
8	24.98	0.1552	95.06	11.3
11	21.92	0.0751	0.12	10.9
20	20.42	0.0367	30.02	20.9
23	17.85	0.0884	68.27	28.6

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