EFFECTIVENESS OF COMERCIAL GRADING OF LIVE CATTLE AS REGARDS YIELD AND CARCASS QUALITY.

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SUMMARY: The current system of live cattle classification for slaugther in Cuba is based on vissual assessment of body conformation and live weight at the farm. Carcass grading system would be required, but the definition of quality groups must be implemented before.

Dressing, cutting and bonning data of 71 bulls and eigth carcass measurements were processed by multivariate analysis. Grouping based on carcass measurements was more closely related to meat production indices than to original animal classification.

INTRODUCTION: In Cuba the current cattle trading system for slaugther is based in live animal classification according to the visual assessment of body conformation and live weight at the farm. In practice those requirements are not relibly related with meat production indices, causing problems with the planning of slaugtherhouses operation (Bencomo et al, 1986).

The introduction of a new system based on carcass grading would be a good solution because of the well-known application and commercial security (Ender and Groose, 1987).

Normally, meat yield grade is the main objetive to reach and prediction equations are available using carcass measurements related to the meat production (McNeil, 1983).

Grouping of carcasses according to the meat yield grade and quality traits is the first stage in the implementation of this systems (Price, 1982).

In recent years multivariate analysis are been used as an ordering technique in processing data (Csiba and Kormendy, 1986) so it would be applied in carcass grading when a very genetically heterogeneus livestock is considered.

The objetive of the present paper is to compare the carcass meat yield of cattle when live classification is considered with the grouping achieved by cluster or discriminat analysis.

MATERIALS AND METHODS: Seventy one bulls of different breeds were classified in vivo on the farm into four quality groups according to the standing classification system in Cuba. They were slaughtered after a 24 hr rest.

The following data from each previously identified carcass were registered: hot carcass weight, kg; fore and hind legs, kg; kidney fat, kg; carcass length (from the first rib to the symphysis of pubis), cm; thorax width (on the fourth rib from the spinous apophysis of the fourth thoracic vertebra to the sternon), cm and L. dorsi muscle area, cm^2 (Bass et al, 1981., Tatulov et al 1987).

After 24 hr in the cooler, the half-carcasses were dissected into lean, fat and bone. The values were multiplied by two to estimate whole carcass composition. In order to avoid the asymmetry bias dued to carcass halving, dissection was randomly done to the right of left half-carcass (Tatulov et al, 1987).

The data were analysed using a one-way analysis of variance in order to detect differences between quality groups. In order to obtain a new way of animal grouping a discriminant analysis was performed ordering the four new groups with the classification criteriun of the 8 carcass measurements. With the same purpose and using the data from 8 variables plus total lean of each carcass, the cluster analysis was performed after which results were compared with the in vivo classification.

RESULTS AND DISCUSION: The means, maximun and minimun values of the main carcass traits describing the current classification groups are shown in Table 1. Carcass and lean weight significantly ($P < 0{,}001$) decrease as the quality grade of the animals classified in vivo diminishes, but lean yield does not follow this trend because it remains practically constant. Even the animals in the firts and fourth group have a similar means value. Similar results have been reported when studying the effect of live weight on lean yield in commercial animals (Bencomo et al, 1986).

When observing the maximun and minimun values of three variables in each group it is evident that they overlap, so that there are bulls in the higher groups that could very well be in lower groups and viceversa. This happens because in the in vivo classification the individual merit of each animal cannot be evaluated, but it is the average characteristics of the group which are considered. This fact can cause problems in planning the slaugtherhouses operations.

Considering the results obtained so far, a new classification was done using carcass traits related to lean weight and yield, all of which can be measured in the intac carcass.

Table 2 shows the classification matrix of the discriminant analysis performed using the 8 characterization variables from the 71 carcasses. It is evident that a new distribution is obtained in which four new groups were formed. For example, a group P1 contains 16 carcasses from 18 that it previously had and the other 2 passed to group P2. This demostrates that the previous groups contained carcasses that did not belongs there. The group worts classified was the second grade bulls. The percentage of good classification of the previous system related to the new one was 81,2 %.

A descriptive analysis of the eight characterization variables plus total lean weight and yield of the newly formed quality groups is shown in Table 3. This classification does not show either any relation between yield and quality grades. So another grouping method was used, the cluster analysis.

Table 4 shows the distribution of the carcasses obtained. It is obvious that all the carcasses were distributed into three groups. Group G1 kept 77 % of the carcasses coming from the previous first grade bulls, group G2 96 % of the second grade and group G3 only 26 % of its previous group. This implies that in vivo classification underestimates the real lean potencial of the animals. Notiçe that all the bulls in fourth quality grade are now in the third group defined by cluster analysis. In briep, from 71 bulls only 62 % remained in their previous classification, the rest was classified wrongly attending to their quality and lean yield in the carcass.

Table 5 offers the descriptive parameters of the last classification groups. It is evident that overlapping has disappeared and that yield diminishes as carcass quality is reduced. So that it can be assured that this classification is more rational and that the characterization parameters are now better adjusted to the actual commercial value of the animaL.

CONCLUSIONS: It was demostrated that when bulls are classified in vivo the individual lean potencial of the carcass cannot be estimated so there is not reliable relationship between the actual and the expected yield of the animals according to the commercial requirements of the quality grades.

The groups obtained using the cluster analysis showed a more rational adjustment and differentiation, supporting the use of this grouping methods in elaborating carcass classification systems.

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Table 1

Means, maximun and minimun values of carcass traits of current clasification groups.

Traits		Bull quality groups 1th Q	2th Q	3th Q	4th Q
Hot carcass wt.	kg	216.1 a	186.3 b	167.3 c	137.0 d
maximun	kg	257.0	213.0	178.0	156.0
minimum	kg	189.0	163.0	153.0	114.0
Lean weight	kg	138.1 a	116.3 b	103.7 c	86.6 d
maximun	kg	179.6	143.2	120.8	99.6
minimun	kg	118.6	99.0	86.3	72.8
Meat yield	%	63.8 a	62.4 a	62.0 a	63.1 a

significative differences P< 0.001

Table 2

Classification matrix of discriminant analysis

New groups		P1	P2	P3	P4
n=		17	24	24	6
Prev. groups	n				
1th qualt.bull	18	16	2	0	0
2th qualt.bull	26	1	21	4	0
3th qualt.bull	19	0	1	18	0
4th qualt.bull	8	0	0	2	6

Percentage of good classification = 81,2 %

Table 3

Characterization of a new groups formed by discriminat analysis

Traits		New quality groups P1	P2	P3	P4
Hot Carcass wt.	kg	215.7	180.6	168.4	129.2
Head weigth	kg	11.7	10.27	10.72	8.8
Hind legs wt.	kg	4.64	3.94	3.96	3.12
Fore legs wt.	kg	4.93	4.06	4.19	3.27
Kidney fat wt.	kg	1.02	1.20	0.44	0.35
Carcass length	cm	123.0	116.0	117.0	112.0
Thorax width	cm	42.0	39.0	43.0	42.0
L. dorsi area	cm^2	59.0	52.3	51.3	47.4
Lean wt.	kg	137.0	112.1	105.2	81.9
Meat yield	%	63.8	62.1	62.5	63.4

Table 4

Carcass grouping by cluster analysis

New quality groups		G1	G2	G3
	n=	16	42	13
Previous groups	n			
1th qualt.bull	18	14 (77%)	4	0
2th qualt.bull	26	1	25 (96%	0
3th qualt.bull	19	1	15	5 (26%)
4th qualt.bull	8	0	0	8

table 5

Means, maximun and minimun values of carcass traits of groups formed by cluster analysis

New groups		G1	G2	G3
n=		16	42	13
Hot carcass wt	kg	220.7	181.2	135.4
maximun	kg	257.0	199.0	162.0
minimun	kg	204.0	163.0	119.0
Lean weigth	kg	142.1	112.7	83.8
maximun	kg	179.4	131.0	99.6
minimun	kg	129.0	99.0	72.8
Meat yield	%	64.4	62.2	61.9