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INFLUENCE ON FATTENING RESULTS OF PURCHASE CRITERIA AND GROUPING STORES BY PURCHASE WEIGHT

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INFLUENCE ON FATTENING RESULTS OF PURCHASE CRITERIA AND GROUPING STORES BY PURCHASE WEIGHT

I. - INTRODUCTION .-

The end product in animal production schemes is highly dependent on the initial choice of individual animals. Whether this decision is made in a cattle market among farmers or in a breeding centre among scientists, this crucial moment often appears very mysterious to less experienced farmers. However, when large numbers of cattle are to be fattened on contract, it is essential to define purchase criteria that can be readily applied by field personnel with little previous experience in livestock trading ; such standards must be based on animal traits which are easy to assess and which provide reliable and useful information.

The purchase standards developed by the GCP/TUN/010/SWE project have reduced subjective differences among livestock purchasing agents and ensured a choice of suitable stores for short term semi-intensive fattening. Nevertheless, although these standards have proved themselves most useful to purchase animals, it is interesting to explore how some of its traits relate to fattening performance.

2. - MATERIAL AND METHODS .-

Fattening performance records were made available by the GCP/TUN/010/SWE project from their 1976 beef recording files. Fattening units fell into two categories : those using indigenous bulls bought by the project and dispatched as units made up of cattle with similar purchase weight (project's cattle), and those made up of stores belonging to the farmer (farmer's cattle). No selection standards were applied to the latter group and no attempt was made to group them by their initial liveweight.

All cattle was fattened-off silage (whole-crop barley or oats associated with vetch or peas) ad-libitum plus a daily supplement of 3 kilos of concentrate per head to provide a balanced ration. Animals were kept under commercial conditions and individually weighed every month. Husbandry and management levels varied enormously among farms ; purebreds received preferential attention and were often better fed and looked after than indigenous cattle.

Purchase standard for indigenous stores was based on the following points :

Trait	Description	Assessment
Sex	No castrated male	Visual
Health	No apparent disease symptome	Visual
Physical appearance	No physical defects	Visual
Age	Indirect verification : . All milk teeth present	Visual
Body size	Minimum height at withers of 105 centimeters	Measured
Liveweight	Range from 151 to 230 kg	Weighed after fastening for over 12 hours

The purchase of crossbred stores from indigenous stock relied on the same standard save for liveweight : the range chosen for crossbreds went from 191 to 270 kilos.

Fattening performances were worked out by relating initial and final weights with the number of fattening days. No field data was available for individual liveweights before slaughter ; the best approximation to it was the last on-farm recorded liveweight. Individual carcase weights were recorded by project personnel at the slaughter-house.

Statistical description for traits provided the number of bulls recorded (n) plus average ($\bar{x}$: arithmetic mean value) and variability values (standard deviation : s.d. and coefficient of variation : C.V.). This description was performed for each fattening unit (groups consisting usually of 20 to 30 bulls) as well as for groupings of several fattening units. Regression analysis between variables used the product-moment method to compute estimates of correlation (r) and regression (b) coefficients.

3. - RESULTS AND DISCUSSION .-

3.1. - Results for 1976

Overall average results of almost 200 fattening units of project owned cattle (see table 1) indicated initial liveweights of about : 205 kilos, final liveweights of approximatelu : 310 kilos and daily gains of around : 700 grammes for a fattening period of some 150 days. Variability for daily gain and length of fattening period was high (C.V. of about 24 %),

normal for final liveweight (overall C.V. of 7.8 %) and very low for initial liveweight (overall C.V. of 4.3 %) as expected on account of re-grouping purchased bulls by their weight.

Table 1

Fattening results from project-owned cattle : 1976

Purchase category	Nb. of units	Nb. of bulls	Initial lwt.kg			Final lwt.kg			Daily gain, g			Patten.period,days		
			$\bar{x}$	sd	C.V.	$\bar{x}$	sd	C.V.	$\bar{x}$	sd	C.V.	$\bar{x}$	sd	C.V.
151-170	8	164	164.3	7.5	4.6	283.3	20.8	7.3	759.5	133.6	17.6	148	19.2	13.0
171-190	41	713	182.4	7.3	4.0	297.8	23.7	8.0	728.0	152.5	20.9	159	36.9	23.2
191-210	69	1303	198.3	9.2	4.6	312.4	25.3	8.1	723.8	152.9	21.1	157	36.4	23.2
211-230	45	857	220.7	9.4	4.3	309.8	23.5	7.6	642.3	191.5	39.8	132	35.5	26.9
231-250	24	456	237.0	9.7	4.0	334.2	25.5	7.6	707.7	185.6	26.2	136	32.4	23.8
251-270	6	111	256.1	9.8	3.8	349.0	25.9	7.4	581.6	141.8	24,4	155	30.7	19.8
Tot.& Aver.	193	3604	205.6	8.9	4.3	311.5	24.4	7.8	700.5	164.9	23.5	148.3	34.8	23.5

These results allow several comments :

a) It can be shown that even when dealing with very heterogeneous cattle it is possible to reduce individual differences by re-grouping bulls on the basis of their purchase weight to suit fattening purposes.

b) Daily gains recorded for periods ranging from 4 to 5 months showed adequate average levels for semi-intensive beef fattening conditions (700 grammes).

c) Very high variability in daily gains indicate that important husbandry aspects were overlooked during the fattening period. An important contribution from fattening ability among individuals to overall variability was also evident.

d) Average values for final liveweight suggested that cattle were slaughtered too soon, and that total gain per head during fattening could be increased.

Results from the same data, when computed over each of the six purchase categories, provided sets of values which show certain trends when related to their rank order in purchase weight.

Final liveweight average values for each category increased as liveweight at purchase increased. This positive trend could be partially explained by certain differences in body frame which is quite evident between extreme purchase categories ; light bulls corresponding mainly to small framed indigenous animals while heavier bulls (from 230 to 270 kilos) belonged to Tarentais, Brown Swiss and Friesian crossbreds. However, interpretation of final liveweight results is difficult on account of two restrictions imposed by field recording facilities and by farm decision which deviate from standard technical recommendation given by the project ; these are the following :

- Individual final weight available for analysis corresponds to the last on-farm beef recording result, no individual records being available for pre-slaughter liveweight.

- There is no way of checking whether animals slaughtered at a certain weight could not have been kept in the farm up to heavier liveweights.

Average values for daily gain also revealed a trend between this set of values and those ranking purchase weight, but it was a negative trend : lighter bulls at purchase tending to grow faster than bulls belonging to heavier categories.

A preliminary correlation study based on 3 579 young bulls (192 fattening-units) showed an overall non-significant estimate of -.129 between average values for initial liveweight and daily gain in each fattening-unit. This estimate, however, does not take account of within-group variability.

It is also important to note that daily gain was far more variable in fattening-units of bulls with heavier purchase weights (211 to 270 kilos) than in lighter categories. Differences in age could be a plausible explanation for such results : the lighter categories would on the whole correspond to much younger animals which once adapted to their fattening rations would gain reasonably well on account of their growth potential. Bulls with heavier purchase weights, reared under extensive grazing conditions, should by and large correspond to older animals (and this group could even include some stunted cattle) ; therefore as growth impetus declines with age this could account for their poorer results. The possible individual differences in age and in their previous nutritional hazards could explain the higher variability found within heavier purchase weight categories.

Table 3

FATTENING RESULTS FROM PROJECT-OWNED CATTLE
MEDJEZ RESULTS 1976

Purebred cattle	Number of units	Number of bulls	Initial liveweight kg		Final liveweight kg		Daily gain g			Fattening period days			Carcase weight kg			Carcase yield %
151-[illegible]	1	7	164.4	± 12.1	7.1	328.7	± 14.9	4.5	800.6	± 83.5	10.4	199.0	± 0.0		189.0	± 8.0	4.2	57.4
171-190	3	32	183.1	± 6.9	3.8	302.2	± 26.5	8.8	697.9	± 216.2	31.0	178.3	± 29.8	16.7	172.1	± 17.0	9.9	56.7
191-210	7	99	201.4	± 7.9	3.9	332.9	± 25.0	7.5	765.4	± 148.2	19.4	174.9	± 16.2	9.3	186.8	± 15.1	8.1	56.2
211-230	9	101	220.0	± 13.7	6.2	343.4	± 38.7	11.3	780.5	± 257.9	33.0	164.0	± 42.3	25.8	195.8	± 21.4	10.9	57.5
231-250	2	37	236.7	± 8.8	3.7	330.0	± 18.4	5.6	729.2	± 212.3	29.1	135.1	± 33.4	24.8	184.0	± 11.2	6.1	55.6
251-270	2	39	256.6	± 9.1	3.6	336.5	± 27.0	8.0	502.1	± 171.6	34.2	161.5	± 6.1	3.7	186.8	± 17.4	9.3	54.5
Total and averages	24	315	215.8	± 10.0	4.6	333.2	± 28.8	8.6	727.3	± 199.3	27.4	165.9	± 28.4	15.9	187.9	± 17.0	9.0	56.4

Overall average results of beef fattening units made up of cattle owned by farmers are presented in table 2. About two thirds of their cattle belonged to purebred types and only one third to indigenous bulls.

Table 2

Fattening results from farm-owned cattle :1976

Type of cattle	Nb.of units	Nb.of bulls	Initial lwt.kg			Final lwt.kg			Daily gain,g			Fatte.period,days		
			x	sd	C.V.	x	sd	C.V.	x	sd	C.V.	x	sd	C.V.
Friesian	51	806	279.2	34.4	12.3	404.8	43.0	10.6	956.0	224.6	23.5	132	28.8	21.8
Brown Swiss	13	151	238.1	43.7	18.4	339.4	41.6	12.3	840.6	216.9	25.8	146	26.4	18.1
Others	21	270	242.3	51.7	21.3	360.2	50.3	14.0	781.0	124.4	15.9	146	39.5	27.1
Indigenous	46	618	209.1	43.2	20.7	306.2	41.5	13.6	731.4	173.6	23.7	14[illegible]	42.5	29.5
Tot.&Aver.	131	1845	247.0	40.6	16.4	359.9	43.5	12.1	845.7	192.2	22.7	139.2	34.8	25.0

If these results are compared with those in table 1 they show : consistently higher values for initial liveweight, final liveweight and daily gain, save for the indigenous group which did not differ greatly from results computed from similar cattle owned by the project. Although some purebreds were kept to heavier final liveweight (360 to 400 kg) than most indigenous cattle, average values were still well below standard slaughter weights used in Europe and America. Daily gain averages indicated in general, good results for fattening periods of about 4 to 5 months ; preferential treatment of this group of animals cannot be discarded, which could thus allow better conditions to express their growth potential.

3.2. - Carcase weight results

Unfortunately individual carcase weight data was not available for all cattle at the time of the analysis. However, some farms in Medjez, one of the eight regional sub-divisions of the project, included carcase weight results and in addition the length of fattening period was recorded more accurately than in the previous data. It was considered therefore that it could be more interesting to use this sample rather than the complete data to explore further the negative trend between purchase weight and daily gain. Statistic description of traits for the Medjez data from indigenous cattle purchased by the project is summarized in table 3.

In general results for the Medjez data coincide with those presented in table 1. The smaller number of information within initial liveweight categories can account for higher fluctuation of average values among them in several traits. This is the case in question for daily gains where the negative trend reported above can still be observed but less clearly. What is important and could not be assessed in the former data is that bulls in fattening units ranking low in purchase weight (151 to 170 kg) provided normal carcase weights and achieved higher than average carcase yields.

Results of the study on the relationship between purchase weight and daily gain during fattening are presented in table 4.

Table 4

Relationship between purchase weight and daily gain : indigenous cattle

Initial liveweight,	Number of bulls	Correlation between initial liveweight and daily gain : r	Regression results b ± s.e.
151-170	7	- .501	- 3.466 ± 2.677
171-190	32	- .492 **	- 15.478 ± 5.004
191-210	99	- .075	- 1.412 ± 1.910
211-230	101	+ .025	+ .465 ± 1.896
231-250	37	- .022	- .521 ± 4.066
251-270	39	+ .063	+ 1.183 ± 3.088
Pooled	315	- .035	- .704 ± 1.122

Note : ** significant level : $P \leq 0.01$.

The trend in average daily gain values among initial liveweight categories was not confirmed by these results as an association between these traits ; the overall regression sum of squares accounted for only a small portion of the total variability in daily gain. In spite of this it is interesting to note that regression sum of squares within the two lightest initial liveweight categories (151 to 170 and 171 to 190 kg) did contribute substantially to explain variability in daily gain, and reaching a highly significant statistical level for data from the 171 to 190 kg purchase

category ($r = -.492$ for $P \leq 0.01$). Differences in age and previous nutritional levels within this category could be responsible for higher growth rate among bulls with lighter liveweights at purchase. The range of 19 kilos within each category could allow lighter bulls to be considerably younger, or to be emerging from a temporary period of poor growth after weaning ; these conditions could account for subsequent fast growth.

4. - CONCLUSIONS .-

On-farm results from commercial beef fattening units fed a silage ration (whole-crop barley or oats associated with vetch or peas) plus a daily concentrate supplement (3 kg/head) stand as a considerable achievement of tunisian livestock development policies (GCP/TUN/010/BMZ project operating within the Livestock and Pastures Agency). Results from over 3,600 young bulls suggest that most farmers could improve the use of natural local resources by fattening indigenous cattle on silage, and which can attain average daily gains of about 700 grammes in a fattening cycle of 5 to 6 months.

Standard purchase criteria to choose stores and re-grouping bulls by weight before fattening has reduced individual differences among cattle in the same fattening unit ; bulls finishing-off at similar dates within a fattening unit represents a big practical advantage to farmers. Cattle owned by farmers and which do not undergo these pre-fattening procedures showed significantly higher variability in final liveweight.

A slight trend between purchase liveweight and daily gain observed for average values among purchase categories proved no evidence of an overall correlation in the analysis of a sample data (Medjez, 1976). However a highly significant correlation ($r = -.492$) was present among bulls weighing from 171 to 190 kilos at the moment of purchase ; age and previous nutrition could explain this relationship.

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