CARCASS COMPOSITION OF PIGS FATTENED ON SWILL AND DIFFERENT TYPES OF SUGAR-CANE MOLASSES AD LIBITUM OR RESTRICTEDLY

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SUMMARY

Pigs fed diets based on swill,Torula yeast and different types of sugar-cane molasses (final, type "B" and high-test) produced leaner carcasses than pigs fed corn and Torula yeast on account of the lower metabolizable energy:true protein (ME:TP) ratio of the former. Pigs fed ad libitum deposited more fat on the carcass than those fed restrictedly. In order to obtain high quality carcasses, the ME:TP ratio must be considered when elaborating feeding systems based on sugar-cane molasses.

INTRODUCTION

The use of diets based on different types of sugar-cane molasses combined with Torula yeast or swill for growing pigs (from 100 days of age on) is being studied in Cuba in order to increase meat production using mainly national sources (Pérez et al. 1984, 1987; González et al. 1986; Domínguez et al. 1986; Figueroa et al. 1986).

The results of productive performance are promising because daily gains overrates the 900 g in ad libitum diets and 600 g in restricted feed intake (Figueroa et al. 1986). One of the subjects which has been investigated in this study is carcass composition. Results demonstrate that pigs fed high-test molasses and cream Torula yeast deposit daily more lean in the carcass even though, at the same age, these animals showed fatter carcasses than pigs fed the traditional grain feed (Cruz-Bustillo et al. 1987).

This paper presents the results of the study of dissected carcasses of pigs fed swill and different types of sugar-cane molasses under two levels of intake: ad libitum or restricted.

EXPERIMENTAL METHODS

Ninety-three Yorkshire-Landrace by Hampshire gilts of approximately 90 kg live weight were used. During the growing period the pigs were allotted in a random-block design and they were offered the diets described in Table 1 under one of two levels of intake: ad libitum or restricted. The performance data of these pigs were reported in a previous paper (Pérez et al. 1988).

The animals were slaughtered as they reached 90 kg live weight. The cold carcasses were weighed and the right side dissected (Kielanowski and Osinska 1954).

To analyze the data the least-squares method was used (Harvey 1987) with a model which included the effects of the diet, the intake level and their interaction. Whenever it was necessary, the multiple-range test for means (Duncan 1955) was used.

RESULTS AND DISCUSSION

Significant interactions were evident only in one trait and with a low (P<0.05) level of significance (Table 2). Therefore only the main effects will be discussed. In general, very few traits were altered by the diet probably due to the fact that the differences between diets in the energy:protein ratio were not very large. Another fact to consider is that the animals were slaughtered at similar live weights. Both facts probably contributed to this

TABLE 1. Composition of the diets

Composition (%)	Experimental diets Corn	FM	BM	HTM
Ground corn	81.6	-	-	-
Swill	-	56.6	55.6	53.4
Torula yeast	14.5	17.5	17.2	16.5
Final molasses	-	28.9	-	-
Type "B" molasses	-	-	26.0	-
High-test molasses	-	-	-	24.8
Premix Vits. and Minerals	1.0	1.0	1.0	1.0
Dry matter (DM)	89.1	27.0	26.2	26.2
Ashes	5.6	9.1	8.5	7.1
True protein[1]	15.2	16.6	17.3	17.6
ME[2] (MJ/kg DM)	15.1	13.4	14.3	14.6
ME:TP ratio [3]	0.99	0.80	0.83	0.83

[1]True protein is total Nitrogen from Torula yeast and from swill, the latter adjusted from: Proteic N=Total N *0,67 (Maylin 1983)
[2]Metabolizable energy: adjusted from swill (González 1984) and molasses and Torula yeast (Pérez et al. 1986) balance data.
[3]Metabolizable energy: true protein ratio

TABLE 2. Results of ANOVA for carcass traits

Carcass trait	Diet	Intake level	Interaction	General constant
Live weight, kg	NS	NS	*	91,7
Carcass yield, %	***	***	NS	70,9
Cold carcass, kg	***	***	NS	65,1
Backfat thickness, mm	***	*	NS	28,9
Carcass lean, kg	NS	NS	NS	29,9
Carcass fat, kg	**	***	NS	13,5
Lean, % carcass	*	**	NS	46,0
Fat, % carcass	NS	*	NS	20,8

* P<0.05 ** P<0.01 ***P<0.001 NS=Non significant

TABLE 3. Carcass traits of pigs fed different types of sugar-cane molasses and swill

Carcass trait	Experimental diets Corn	FM	BM	HTM	S.E.
Carcass yield (%)	73.4[a]	70.4[b]	70.2[bc]	69.8[c]	0.4***
Cold carcass (kg)	67.3[a]	64.7[b]	64.2[bc]	64.1[c]	0.4***
Backfat thickness (mm)	31.4[a]	28.4[b]	27.4[b]	28.3[b]	0.6***
Carcass fat (kg)	14.5[a]	13.2[b]	13.3[b]	13.1[b]	0.3**
Lean (% carcass)	44.8[b]	46.4[a]	46.3[a]	46.6[a]	0.4*

*P<0.05 **P<0.01 ***P<0.001
[a,b,c]Mean values in a row without letter in common differ at P<0.05 (Duncan's multiple range test).

TABLE 4. Effect of level of feed intake on pig carcass traits

Carcass trait	Level of intake Ad libitum	Restricted	S.E.
Cold carcass (kg)	66.0	64.1	0.3***
Backfat thickness (mm)	29.7	28.1	0.4*
Carcass fat (kg)	14.1	12.9	0.2***
Lean (% carcass)	45.4	46.6	0.3**
Fat (% carcass)	21.3	20.2	0.3*

*P<0.05 **P<0.01 ***P<0.001

finding. The general constants of the model represent average carcasses for 90 kg-pigs.

Table 3 shows the least-square means for the three nutritional treatments compared with the control in traits which showed significance in the analysis of variance. Pigs fed molasses had less fat content ($P < 0.01$) and backfat thickness ($P < 0.001$) than those fed corn and Torula yeast. Lower ($P < 0.001$) carcass yields (cold carcass:live weight on the farm) and carcass weights but higher ($P < 0.05$) lean percentages were evident in the carcasses of the pigs fed molasses and swill diets. The effect of a higher energy and lower protein content in the control diet is shown in the quality of the carcasses. Although the significance of this trait was low ($P < 0.05$), it is important to observe that an increase of 1% lean actually produces a shift in carcass quality grades in some pig carcass grading systems (Anon. 1986).

Carcass composition of pigs fed different types of sugar-cane molasses combined with Torula yeast as a protein source was recently studied in our country and results showed that the carcasses of the animals fed the molasses diets were slightly ($P < 0.05$) fatter than those fed the traditional grain diet (Cruz-Bustillo et al. 1988). This finding was probably due to the lipogenic character of molasses on account of their higher fructose content. In our experiment, the higher energy:protein ratio of the control diet influenced more the carcass composition than the lipogenic character of molasses because the diet contained only 30% molasses.

The effects of the level of intake on carcass traits are shown in Table 4. As expected, the intake level altered a greater number of traits with leaner carcasses for pigs fed the restricted level. Kempster and Evans (1979) reported that a restricted level of intake could retard the normal rate of body maturation and this fact could explain the higher quality of restricted-pig carcasses. On the other hand, it has been demonstrated that adipose tissue shows a higher and later growth rate than bone and muscle (Walstra 1980).

CONCLUSIONS

1. Pigs fed diets based on swill, Torula yeast and different types of sugar-cane molasses (final, high-test and type"B") produced leaner carcasses compared with pigs fed the corn and Torula yeast control diet.

2. The former resulted from the lower metabolizable energy:true protein ratio of the experimental diets containing molasses.

3. Ad libitum-fed pigs deposited more fat in the carcass than those fed restrictedly.

4. In order to obtain high-quality carcasses, it is recommended to consider the metabolizable energy:true protein ratio when elaborating feeding systems based on sugar-cane molasses.

REFERENCES

Anonymous (1986). Canada Gazette, Part II, **120(8)**:1657.

Cruz-Bustillo, D., González, A.M., De la Mella, R., Diéguez, F.J., Gómez, R.A. and Sánchez, A. (1987). Evento Provincial ACPA, Filial Ciudad de la Habana, Resúmenes,44.

Cruz-Bustillo, D., Sánchez, A., Barreto, B., Ortega, U., Castillo, L. and Altunaga, P. (1988). Proceedings, 10 th Congress IPVS, Brazil, Aug. 14-17.

Domínguez, P.L., Mendoza, M. and Veranes, G. (1987). Evento Provincial ACPA, Filial Ciudad de la Habana, Resúmenes,37.

Duncan, D.B. (1955). *Biometrics* **11**:1.

Figueroa, V., Maylín, A. and Pérez, M. (1987). Evento Provincial ACPA, Filial Ciudad de la Habana, Resúmenes,41.

González, J. (1984). Thesis. Ciudad de la Habana, 151 pp.

González, J., Domínguez, P.L. and Pérez, A. (1987). Evento Provincial ACPA, Filial Ciudad de la Habana, Resúmenes,42.

Harvey, W.R. (1987). "Mixed Model Least-squares and Maximum Likelihood Computer Program". PC-1 Version.

Kempster, A.J. and Evans, D.G. (1979). *Journal of Agricultural Science, Camb.* **93**:349.

Kielanowski, J. and Osinska, Z. (1954). *Roczn. Nauk* **67**:8.

Maylín, A. (1983). Thesis, Ciudad de la Habana, 106 pp.

Pérez, A., Mora, L.M., Pérez, M., González, J. and Domínguez, P.L. (1988). XI Reunión ALPA, Havana, April 15-23, Resúmenes, NR44.

Pérez, A., Cervantes, A., Pérez, M. and Figueroa, V. (1987). *Ciencia y Técnica en la Agricultura. Ganado Porcino* **10(3)**:In press.

Pérez, A., Mora, L.M., Ly, J., Domínguez, P.L. and Maylín, A. (1988). *Ciencia y Técnica en la Agricultura. Ganado Porcino* **11(2)**:In press.

Pérez, A., Pérez, R. and Figueroa, V. (1984). *Ciencia y Técnica en la Agricultura. Ganado Porcino* **7(3)**:43.

Walstra, P. (1980). Meded. Landbouwhogeschool, Wageningen 80-4, p206.