

for monkeys and the ability to multiply in MKTC and mice as well as in chicken embryos found in the G.O. strain seems to offer advantages for a Type II poliovirus vaccine.

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VETERINARY SCIENCE

Influence of Anabolic Steroids versus Effect of Glucose on Muscular Degeneration in Pigs

THE literature on the problem of muscular degeneration in pigs has offered various hypotheses, though a definite cause for this condition or an effective control method has not yet been found¹⁻³. It is questionable whether the nutritional muscular dystrophy found in Sweden⁴ shows any aetiological relation with the aforementioned abnormality.

American research workers in particular⁵⁻⁷ have shown that, at the moment of slaughter, the glycogen-level partly determines whether the meat will be white, weak and wet, or good in colour, firm and not weepy.

Reference must also be made to the fact that Bendall⁸ regards the quality of the sarcolemma as an important causal factor in the rapid post-mortem decrease in the pH of degenerated meat. One of us⁹ proved that, after the animal's death, there are distinct differences between degenerated meat and meat originating from normal samples with regard to the quantities of the various

three-week intervals, the last dose being administered twelve days before slaughter.

It is known from the literature that these and other anabolic steroids cause distinct retention of nitrogen¹⁰ in man.

After slaughter the m.long.dorsi was examined on muscle degeneration both visually and with the aid of the aforementioned transmission value method.

The results are given in Table 1.

The agreement between visual examination and transmission value determinations proved to be rather good. The correlation coefficient (r) was 0.75. The difference between the average transmission value of the 'Durabolin' group and the glucose group was significant ($P < 0.05$). Calculation according to the χ^2 method revealed that on the basis of visual examination the ratio between normal samples and those considered as degenerated did not differ significantly between groups ($0.20 > P > 0.10$). Significant differences, however, occurred on the basis of the results of the transmission value determination. If samples with a transmission value ≤ 30 are considered normal, there is a significant difference between the relative groups in the relation between the quantity of normal and abnormal animals ($0.001 < P < 0.01$). Besides, it appeared that significant differences also exist between the groups as regards the ratio between degenerated and non-degenerated samples, considering the samples with a transmission value > 60 as being degenerated ($0.02 < P < 0.05$). In other words, there were distinct differences between the groups both as regards the number of degenerated samples and the number of normal samples.

From the foregoing we may conclude that:

(1) When examining the degree of muscle degeneration in pigs the transmission value method provides a sharper distinction than visual examination.

(2) The influence on muscle protein metabolism, attributed to anabolic steroids, may favourably affect muscle degeneration, while, on the other hand, this abnormality is promoted by the administration of glucose.

Table 1

Group	No. (per cent) of normal samples				No. (per cent) of degenerated samples				Total No. per group	Average transmission value
	Visual		Transmission value ≤ 30		Visual		Transmission value ≥ 60			
	N	(per cent)	N	(per cent)	N	(per cent)	N	(per cent)		
'Durabolin'	5	(46)	4	(37)	3	(27)	3	(27)	11	53 \pm 8.8
Control	5	(30)	-	(—)	6	(35)	9	(53)	17	74 \pm 5.9
Glucose	1	(1)	-	(—)	7	(64)	9	(82)	11	83 \pm 5.2

proteins soluble in water and the quantities of sarco-plasma and myofibrillary proteins.

These differences form the basis of a physico-chemical method by which the degree of degeneration can be expressed^{10,11}. In a nephelometer (Bausch and Lomb) at a wave-length of 600 m μ the percentage of light measured is transmitted through a watery solution of the meat extract, which, with the aid of a phosphate buffer, has been brought to the iso-electric point. This method is called the transmission value-method. An important point gained is that, instead of the different figures obtained by pH measurement, free water determination and 'total colour' measurement, one single transmission value-figure will suffice and, further, the difference between degenerated and normal samples is better accentuated. We used this method in an experiment with female pigs of the Netherlands Landrace, on one hand trying to increase the glycogen-level of the muscles (24 and 12 h before slaughter about 5 g glucose/kg body-weight was added to the food), on the other hand making efforts to increase the muscle protein by means of 'Durabolin' (nandrolon-phenyl propionate) (supplied by Organon N.V. at Oss) injections. This anabolic steroid was injected four times (each dose 50 mg) with

It is worth mentioning that under the conditions of the experiment various animals in the control group showed symptoms of muscle degeneration in the m.long.dorsi.

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