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ABSTRACTS OF COMMUNICATIONS

The Seventy-fourth Meeting of The Nutrition Society (Thirty-fourth of the Scottish Group) was held in the West Medical Theatre of the Royal Infirmary, Edinburgh 3, on Saturday, 19 April 1952, when the following papers were read:

Muscular Abnormalities of Newborn Calves in Relation to the Tocopherol Nutrition of their Dams. By K. L. BLAXTER and F. BROWN, *Hannah Dairy Research Institute, Kirkhill, Ayr*, and A. M. MACDONALD, *Glasgow University and Royal Hospital for Sick Children, Yorkhill, Glasgow*

In an investigation of the causes of the seasonal and between-calf variations in the onset of muscular dystrophy under experimental conditions, the tocopherol nutrition, muscle chemistry and muscle histology of young calves, born in the late winter and early autumn have been studied.

The tocopherol content of the milk and of the blood serum of newly calved cows reflected the tocopherol intake of the cows before calving. The tocopherol level of the blood serum of 4-day-old calves was closely and directly related to the level in the blood serum of their dams. Placental transfer of tocopherols is considered to be of importance since appreciable amounts were found in the tissues of fetuses and newly born calves.

Chemical analysis of the urine and of the muscles showed that, in the late winter, some calves, irrespective of their tocopherol nutrition, had muscles low in creatine content and exhibited a pronounced creatinuria. The muscles of calves born in late winter contained less creatine than did the muscles of calves born in the early autumn. Many of the winter calves had muscles with hyaline foci of degeneration, and the lesions appeared to be comparable to the initial stages of dystrophic degeneration. The incidence was not closely related to the tocopherol nutrition of their dams. It is possible that the abnormality arises from interaction between tocopherol supply and some unknown environmental factor involving differences in nutrition, weather and management.

The Influence of Diet on the Development of the Alimentary Tract of the Calf. By K. L. BLAXTER and M. K. HUTCHESON, *Hannah Dairy Research Institute, Kirkhill, Ayr* and J. M. ROBERTSON and A. L. WILSON, *West of Scotland Agricultural College, Auchincruive*

Quantitative information on the role of roughage in the development of the fore stomachs of calves was obtained with six Ayrshire bull calves purchased when 3-4 days old. One calf was killed immediately and the remainder were reared in two groups, with and without access to roughage, the allowance of whole milk being adjusted to ensure equality of skeletal and muscular development. Calves were embalmed in the

natural standing position and dissected by stages from both left and right sides. Prior to death, there was a marked distension of the wall of the abdominal cavity in the group which received roughage, and on dissection it was apparent that roughage ingestion had considerably increased the capacity of the fore-stomach compartments. This had taken place without any increase in the weight of the walls, by 'stretching' of the tissues. Roughage ingestion, therefore, increased the capacity of those parts of the ruminant stomach which originate from an oesophageal dilation (see, however, Trautmann, 1931-2).

At 3 months of age the omasal volume of a calf given whole milk alone had increased five times, while one given roughage and milk had increased fifty-four times. The weights of both the small and large intestines, and the weight and capacity of the caecum and omasum, were unaffected by diet. The regional topography and juxtaposition of organs agreed with the findings of Lagerlof (1929) and Schmalz (1895).

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 Trautmann, A. (1931-2). *Tierernähr. u. Tierz.* 7, 400.

The Response of Blood Amino-acids in the Fasting Subject to Glucose and to Fat Administration. By H. N. MUNRO and W. S. T. THOMSON, *Department of Biochemistry, University of Glasgow*

The concentrations of amino nitrogen and of several of the essential amino-acids, were investigated in the blood of healthy adult human beings during fasting and following administration of glucose or fat. Blood samples were taken at four successive hourly intervals following a 15 h fast. When the subjects received no food during this period there was no significant change in amino-acid level of the blood. The giving of glucose caused a highly significant fall in the total amino-nitrogen level which was maximal at the 1st hour after administration. Following the giving of butter, the level fell very slightly.

The levels in the blood of the essential amino-acids we studied were all reduced after giving glucose, but the reductions were neither in equimolar quantities nor were they a percentage of the amount in circulation. Instead, the proportions in which the different amino-acids were affected showed a close similarity to the proportions of different essential amino-acids required by man (Rose, 1950). This suggests that the administration of glucose has an immediate influence on the rate of protein synthesis. Administration of fat does not have this action.

REFERENCE

- Rose, W. C. (1950). *Fed. Proc.* 8, 546.

The Effect on the Growth and Reproduction of Guinea-Pigs of Supplementing Diet 18 either with Cabbage or with Synthetic Ascorbic Acid.

By D. BROWN, I. D. FERGUSON and A. G. RAMSAY (introduced by R. C. GARRY),
Institute of Physiology, University of Glasgow

One group of guinea-pigs was allowed an unlimited supply of cabbage outer leaves and of water, as a supplement to diet 18 (Bruce & Parkes, 1947). A corresponding group received 5 mg synthetic ascorbic acid orally, daily, in place of the cabbage. The ascorbic-acid content of the cabbage was estimated by dye titration (Johnson, 1948). The daily consumption of cabbage was noted. The guinea-pigs ate 50–90 g cabbage daily, providing an intake of 30–55 mg ascorbic acid. No significant difference in intake of cabbage was noted between males and females except during pregnancy, when the intake of the females was slightly increased.

Guinea-pigs allowed cabbage grew more rapidly and had a lower incidence of infection than the corresponding group receiving 5 mg synthetic ascorbic acid. Stillbirths and deaths during pregnancy were common in the females receiving 5 mg synthetic ascorbic acid, whereas females allowed cabbage did not die during pregnancy and produced larger and healthier litters. Females receiving 5 mg ascorbic acid had a calculated mean period from the probable first oestrus to fertile mating of 16 days compared with 2 days in the group allowed cabbage.

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Johnson, B. C. (1948). *Methods of Vitamin Determination*, p. 100. Minneapolis: Burgess.

The Effect of Diet on the Average Protein and Nucleic-Acid Content of the Liver Cell. By R. Y. THOMSON, F. C. HEAGY, W. C. HUTCHISON and J. N. DAVIDSON, *Department of Biochemistry, University of Glasgow*

The effects of fasting, of a high-fat diet, and of diets deficient in protein and aneurin on the content of lipid phosphorus (LP), protein nitrogen (PN), ribonucleic acid (RNA), and deoxyribonucleic acid (DNA) in the rat liver have been investigated. The average DNA content of the liver nuclei has been found not to undergo any statistically significant changes as the result of any of these treatments. The DNA content of the liver may therefore be taken as a measure of cell number and the ratios of the other constituents to DNA as a measure of average cell composition.

The following conclusions may then be drawn:

(1) The total number of cells in the liver was not significantly altered by any of the treatments used.

(2) Fasting for 48 h reduced the average cell mass by 40 % and the average cell

content of LP, RNA and PN by over 20 %. Feeding on an aneurin-deficient diet produced similar results.

(3) The protein-free and high-fat diets caused a 25 % fall in the average cell LP and RNA. With the protein-free diet (but not the high-fat diet) there was a corresponding fall in cell mass and PN.

The Partition of Carotenoids and of Vitamin A in the Colostrum of the Cow and of the Goat. By R. CHANDA, *Hannah Dairy Research Institute, Kirkhill, Ayr*

By chromatography, followed by spectrophotometry (Chanda, Owen & Cramond, 1951; Chanda & Owen, 1952), the partition of carotenoids and vitamin A in the colostrum of nine cows and six goats was determined.

Both the vitamin A and the β -carotene contents of the cow colostrum fat decreased logarithmically with time during the first nine milkings. The decreases in β -carotene were more rapid than those in vitamin A. Cows at pasture secreted in their colostrum fat more β -carotene than did cows on winter rations. The difference between the vitamin A content of the colostrum fat of the two groups was not marked. Cows on winter rations had in their colostrum fat a larger proportion of the total carotenoids in the inactive form than had the cows at pasture. Cow colostrum contained vitamin A alcohol during the 1st week of lactation.

Table 1. *The partition of carotenoids and vitamin A in the colostrum of the cow and the partition of vitamin A in the colostrum of the goat*

No. of milkings post partum	Cow colostrum						Goat colostrum		
	Total carotenoids ($\mu\text{g/g}$ fat)	β -Carotene (percentage of total carotenoids)	Vitamin A			Ester (i.u./100 ml.)	Alcohol (i.u./100 ml.)	Total (i.u./g fat)	
			Ester (i.u./100 ml.)	Alcohol (i.u./100 ml.)	Total (i.u./g fat)				
1	25.1	86	649	44	129	1252	67	195	
2	20.9	79	544	40	96	944	53	172	
3	20.4	75	489	30	91	902	48	157	
4	22.7	63	412	36	84	783	0	145	
5	16.5	65	345	22	70	720	0	123	
6	12.8	78	294	17	65	530	0	112	
7	9.8	81	252	15	58	479	0	95	
8	8.2	76	214	12	49	329	0	75	
9	6.4	78	182	12	41	316	0	69	

The colostrum fat of the goats on winter rations was richer in vitamin A than the colostrum fat of the cows on winter rations. This superiority of the goat persisted when the lactation was established. Vitamin A content of goat colostrum fat also decreased logarithmically with time. In the first three milkings, but not in later milkings, goat colostrum contained vitamin A alcohol. The mean results for three cows and four goats, all on winter rations, are summarized in Table 1.

β -Carotene was demonstrated in goat colostrum but by the eleventh milking it was no longer present.

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The Absorption of Certain Elements from the Alimentary Tract of Sheep.

By D. PARTHASARATHY (introduced by A. T. PHILLIPSON), *Rowett Research Institute, Bucksburn, Aberdeenshire*

Absorption of volatile fatty acids from the rumen under experimental conditions is accompanied by movements of carbon dioxide and of chloride in the reverse direction. Otherwise little information is available regarding the permeability of the rumen epithelium to inorganic elements and other simple molecules. The concentrations of soluble potassium, sodium, chloride and inorganic phosphate ions in the rumen liquor in relation to the corresponding concentrations present in the blood leaving this organ suggest that sodium is absorbed against a concentration gradient; potassium, on the other hand, is absorbed on account of its high concentration in the rumen compared to its concentration in the blood. No evidence of net absorption of phosphorus was found, and, as far as can be judged from the blood picture, chloride appears to enter the rumen. In other regions of the alimentary tract potassium and sodium appear to be absorbed from the small intestine and caecum, while phosphate is absorbed from the omasum and small intestine and chloride from the small intestine and caecum.

The Existence in Human Urine of an Adrenocorticoid Specifically Related to Salt Metabolism.

By C. P. STEWART, J. S. ROBSON and S. L. TOMPSETT,
Department of Clinical Chemistry, University of Edinburgh

One of us (S.L.T.) has devised a procedure which permits a 90% recovery of deoxycorticosterone acetate (DOCA) added to urine whilst cortisone acetate does not interfere significantly. When the procedure is applied to normal urine the DOCA-like substances measured amount to about 5 mg per day (calculated as DOCA); the amount is smaller in cases of Simmond's and of Addison's disease, and is increased after administration of DOCA or ACTH but not after administration of cortisone.

There is a temporary increase in the excretion of the DOCA-like substances after surgical operation at the time when the excretion of potassium is increased. When patients, receiving a diet providing a constant daily intake of nitrogen, sodium, potassium and chlorine, are suddenly deprived of NaCl, there is shortly afterwards an increase, lasting for a few days, in the urinary potassium output and this appears to be paralleled by an increase in the excretion of the DOCA-like substances.