ABSTRACTS OF COMMUNICATIONS.

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250 (2210)

Growth and reproduction of rats on whole milk as the sole diet.

By LEROY S. PALMER and CORNELIA KENNEDY.

[*From the Section of Animal Nutrition, Division of Agricultural Biochemistry, University of Minnesota, St. Paul, Minn.*]

Several investigators have observed the effects of rearing rats on milk diets. Matill[1] and co-workers especially have studied this problem, using dried milk or concentrated solutions of milk powder for the most part in their experiments.

We have made a limited study of this problem with the following results. Using fresh, raw liquid milk exclusively[2] we have successfully raised 3 male albino rats to full size at maturity, beginning at weaning. This trial was begun August 10, 1922. Each rat was kept in a separate cage with one-quarter inch mesh wire bottom without bedding. The consumption of milk solids by these rats has varied between 35 and 100 grams per week per rat. These rats, however, on repeated trials have failed to exhibit any mating instinct when placed with females from our breeding colony, which were known to be in heat.

In a second experiment begun October 24, 1922, two colonies of rats, each containing 5 rats, with both sexes represented, on wire bottom cages, have not attained the expected size at maturity on the fresh, raw, whole milk diet. Growth was normal for the first 50 to 70 days only. The calculated average consumption of milk solids for each rat has not been as high as in the case of the rats in Experiment 1, kept in separate cages. The females have so far been entirely barren, confirming Mattill's results.

In a third experiment 3 female rats reared to partial maturity on mixed diet, each having reared one litter, were placed in

[1] *J. Biol. Chem.*, 1920, xliv, 137-157; 1923, lv, 443-455. The literature is thoroughly reviewed in these papers.

[2] Our rats, however, had access to distilled water containing iodin.

the above colonies on the whole milk diet. To date, one of these rats has littered twice and the other two once, since being placed on the milk diet; for two of these litters the sire must have been one of the male rats raised on the milk diet, but the other two litters may have been sired by a male placed on the milk diet from a mixed ration.

The litters born in this experiment died within a day or two except in two cases. In one case the mother successfully nursed 4 rats on being given a yeast pellet[1] daily in addition to the milk. These 4 rats are now growing rapidly on the milk diet without yeast, but for a period of time were almost hairless. In the other case the mother rat is at present apparently successfully rearing a litter of 6 on addition of 0.2 gram daily of alcohol-extracted[2] yeast, indicating that the deficiency in the milk is not that of vitamin B.

One inference which it has seemed permissible to draw from Mattill's experiments is that the failure to secure normal growth on milk only is due in part to an improper balance between the food constituents. This inference does not seem to be substantiated, however, by a fourth experiment carried out by us in which a colony of 7 rats (3 males and 4 females) have grown normally[3] on an "artificial" dry milk composed of

Casein	18.7
Lactalbumin	3.1
Alcohol-soluble protein	0.5
Butter fat	28.7
Ether extract of alcohol-washed casein	0.5
Protein-free milk	48.5

This mixture contains the essential ingredients of cow's milk in the approximate proportions as they are secured from whole milk. To our surprise three of the females in this colony have littered once and two have littered twice.[4] The first litter of

[1] The yeast was a dried whole yeast for which we are indebted to the Northwestern Yeast Company, of Chicago. The amount given daily varied between 0.2 gram and 1 gram and probably averaged 0.5 for the nursing period.

[2] The dry whole yeast was extracted for 24 hours with hot 80 per cent. alcohol in a Soxhlet type of extractor.

[3] A cage with wire bottom of one-quarter inch mesh was used.

[4] The second litters were sired by males on normal diet, it being necessary to reduce the colony because of shortage of some of the ingredients of the ration.

each rat thrived normally until about the 15th to 21st day when the young began to exhibit weakness, with spasms, and were destroyed by their mothers. In the case of the second litter this result was prevented by giving one mother 0.2 gram of dry whole yeast daily and the other mother 0.2 gram of dry alfalfa meal in the form of a pellet. Five of these second generation rats, representing both litters, are at present doing well on the "artificial" milk," without the additions mentioned.

It is not possible, at present, to reconcile the results of this experiment with those of Mattill or with our own on whole milk. There seems to be evidence that milk only as the sole diet lacks something for the attainment of normal sexual maturity in the female rat. Our results might also be interpreted to indicate a lack of something required for normal lactation, were it not for extensive unpublished data which we have showing that the addition of 10 c.c. of whole milk (1.25 grams of milk solids) to the diet of rats which fail to grow normally, as well as reproduce, has resulted in the securing of normal rats in experiments which have, to date, reached the third generation.

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The effect of local anaesthetics upon the conjunctivitis caused by mustard oil.

By ARTHUR D. HIRSCHFELDER.

[*From the Department of Pharmacology, University of Minnesota, Minneapolis, Minnesota.**]

Spiess[1] and Ninian Bruce[2] have shown that the oedema of the conjunctiva which can be produced by instilling mustard oil into the conjunctival sac of a rabbit, can be prevented by the instillation of 10 per cent. cocaine. Bruce interprets this action as being due to the inhibition of vasdilator axon reflexes to the capillaries

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1 Spiess, G., *Muenchen Med. Woch.*, 1906, 345.

2 Bruce, A. Ninian, *Arch. f. Exper. Path. u. Pharmakol.*, 1910, lxiii, 424.