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Nutritional Requirements of the Rabbit*

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There is abundant evidence[1] that the nutritional requirements of the rabbit are not the same as those of the rat. The possibility that the rabbit may require vitamin C has been considered by all workers in this field, but apparently none except Findlay[2] has found any reason to believe this requirement actually exists.

The first basal diet we used for the rabbit, No. 1002, had the following composition: Casein 20, starch 30, lard 13, cod liver oil 1, wheat germ oil 1, yeast 15, salts 5, cellulose 15. Ration 1535 was used later, and contained milk fat instead of lard, and cellophane instead of cellocotton. The longest survival period on Ration 1002 was approximately 7 weeks. Ration 1002 was then combined with various natural foodstuffs and observations were made on the growth rates and survival periods. The successful combinations are approximately as follows: one part Ration 1002 to: 1 wheat germ, 1 whole milk powder, 3.5 carrots, 6 whole milk, 5 canned tomatoes. In addition Ration 1535 was combined with 25 cc. daily of orange or lemon juice per rabbit. The response of the rabbits to the basal diets and to the various combinations is shown in Table I.

These feeding trials were conducted in an attempt to answer two questions: (1) Does the adequacy of a ration, satisfactory for the rabbit, depend in any marked degree on its composition as determined by the conventional feed analysis? (2) Do any of the substances which make the basal diet complete offer promise of yielding an extract that is equally effective? Our observations lead us to believe the first question can be answered in the negative, and the

* Contribution from the Departments of Animal Husbandry and Agricultural Chemistry of the Missouri Agricultural Experiment Station. Journal Series No. 364.

[1] Nelson, V. E., Lamb, A. R., and Heller, V. G., *Am. J. Physiol.*, 1922, **59**, 335. Hogan, A. G., and Ritchie, W. S., *Mo. Agr. Exp. Sta. Bull.*, 1919-30, No. 300, 23. Goettsch, M., Pappenheimer, A. M., *J. Exp. Med.*, 1931, **54**, 145. McCay, C. M., Madsen, L. L., and Maynard, L. A., *Proc. Am. Soc. Biol. Chem.*, 1933, lxviii.

[2] Findlay, G. M., *J. Path. Bact.*, 1921, **24**, 454.

TABLE I.
Observations on Growth of Rabbits

Ration	Number Observed Died	Survived	Initial Wt. gm.	Maximum Wt. gm.	Observed* days
1002	4	0	590-1100		
1002 + wheat germ	2	2	850-1100	2940-3000	131-177
1002 + whole milk powder	1	1	745-765	2730	169
1002 + carrots	2	3	530-1500	2530-3080	192-260
1002 + whole milk	2	2	730-1200	2920-3300	174-266
Whole milk	3	1	850-1150	2890	199
1002 + canned tomatoes	5	4	900-1150	2550-3800	177-347
1535	4	1	930-1090	2800	153
1535 + orange juice	2	2	675-860	3210-3300	201-225
1535 + lemon juice	1	1	740-930	2890	132

*Rabbits that died are not included.

second in the affirmative. The filtered juice of the orange or lemon (decitrated) were both effective supplements, though we regard orange juice as the most promising. Both sexes were represented in the survivors on this combination, so they were mated. The female bore a litter of 6 and reared 4. One rabbit grew to apparently normal maturity on Ration 1535 alone, so we regard it as more useful for our purpose than No. 1002.

Four guinea pigs have also been reared on the combination of Ration 1535 with 5 cc. daily per animal of one of the fruit juices, orange, lemon, or tomato. They did not grow rapidly and their hair lacks the sleek appearance of normally nourished animals, but they are still in fair condition after 131 days.

Our observations have not indicated any difference in the nutritional requirements of the guinea pig and rabbit except for vitamin C. Since we have reared several generations of rabbits on rations in which vitamin C could not be detected, we are convinced that, at most, provision of vitamin C is a minor problem in formulating a ration that is satisfactory for this animal. We are also convinced our early failures were not due to the provision of an unsuitable quantity of the indigestible component, though they may have been due to the physical state in which this component was supplied. We are now acting on the hypothesis that the failures are due to a deficiency of one or more vitamins, though we are unable to decide whether or not these vitamins are also required by the rat. We feel that our experience[3] with the chick lends some support to this position.

[3] Hogan, A. G., and Boucher, R. V., *Proc. Am. Soc. Animal Production*, 1931, 45.