

Physiology. — "*Diet and reproduction*" II. By G. GRIJNS and K. DE HAAN.

(Communicated at the meeting of April 24, 1926.)

After our communication at the meeting in October a.p. we continued our investigations on the connection between nutrition and reproduction.

We still observed 4 male rats: 2 on maizfood II and 2 on maizfood III all second generation. All 4 were sterile. Thus we found till now among 14 males on the 3 maizfoods that only one was fertile. We also examined some gonads of these rats. They proved to differ much in development; some ones only weighing $\frac{1}{6}$ of normal testes other ones about $\frac{1}{2}$. In the smaller gonads the epithelial cells of the seminiferous tubules were almost totally vanished, and only a few cells rich in protoplasm remembered the spermatocytes. In the other ones spermatogonia, spermatocytes and spermatozoa were present and did not show many differences with those in normal testes. But in fresh smears they showed little mobility even after addition of a solution of glucose.

In an other experience we used an other ration viz. basal ration with yellow fat. This is a vegetable extract mixed to a vitamin free fat, on which we intend to report afterwards, as our investigations on it are not yet finished. The composition of this diet was: albumen 2, casein 15, hardened fat 12, yellow fat 3, rice starch 52, McCollums saltmixture 5, marmite 5, decitrated lemonsquash 5.

The young rats were put to this diet immediately after weaning; they grew well on it, even a bit faster than rats on normal diet, as may be seen from diagram 1.

The results of matings have been recorded in table 1. It shows that fertility, judged by the number of young rats born was very sufficient. Out of 11 matings 2 were sterile; in one case the course of the weight indicated resorption of young; once we only found blood in the cotton-wool of the case of a female we had separated as pregnant. In this case dead young had probably been eaten.

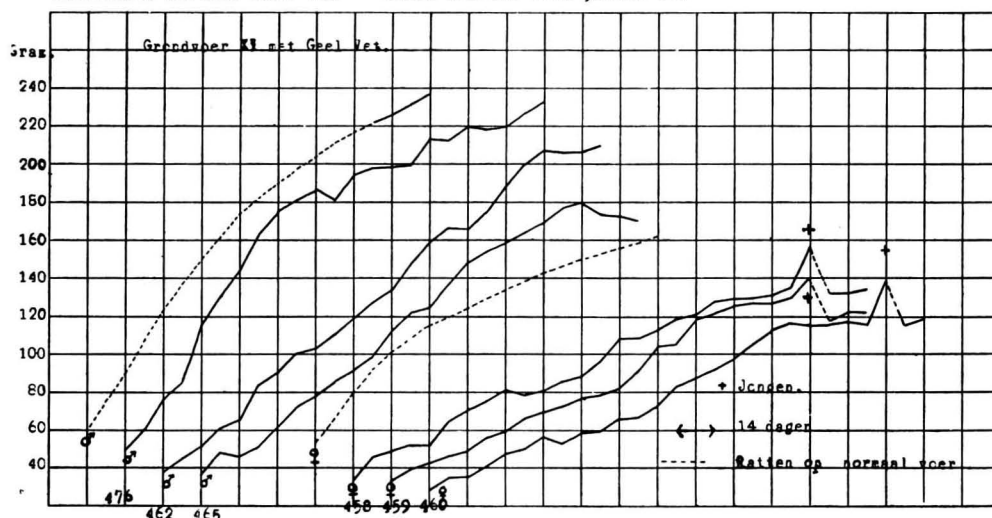
The remaining 6 matings yielded 38 youngs that died all except 2 a few days after birth. The mother of the 2 surviving (young of 460 and 483) had been given normal diet 3 days after whelping.

In a second experiment we used as main food whole wheat meal that had been exhausted with acetone for 10—12 days. According to BARNETT SURE's publications we supposed to be able to remove in this way the fertilising factor. Other vitamins however also being soluble in acetone, we had to supply these.

Therefore we composed a ration XIII as follows: Acetone extracted

whole wheat meal 250, wheat starch 125, hardened fat 60, butterfat 15, casein 25, decitrated lemonsquash 20, saltmixture as in cornfood 15. This

Grondvoer XI met Geel Vet = Basal diet XI with yellow fat.



Jongens = young. 14 dagen = 14 days. Ratten op normaal voer = Rats on normal diet.

Fig. 1.

TABLE 1.
Basal diet XI with yellow fat.

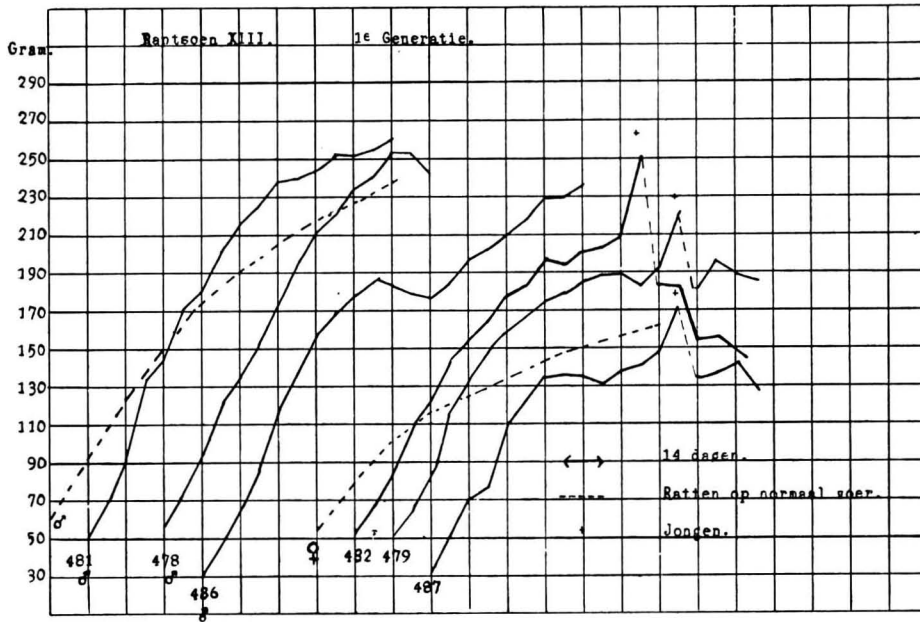
Females	Males	Number of young	Weaned
458	483	7	0
458	467	6	0
458	483	6	0
460	467	7	0
460	483	5	0
460	483	2	2 ¹⁾
463	477	abortus dead young	
463	477		
459	477	0	0
459	471	5	0
459	476	0	—

ration was also fed immediately after weaning. The rats grew very well, as may be taken from the curves in chart 2, where the growth of some at

¹⁾ Normal ration after whelping.

random rats is represented. From 8 matings (see table 2.) we got 51 young rats, 30 of which were weaned or 59 %.

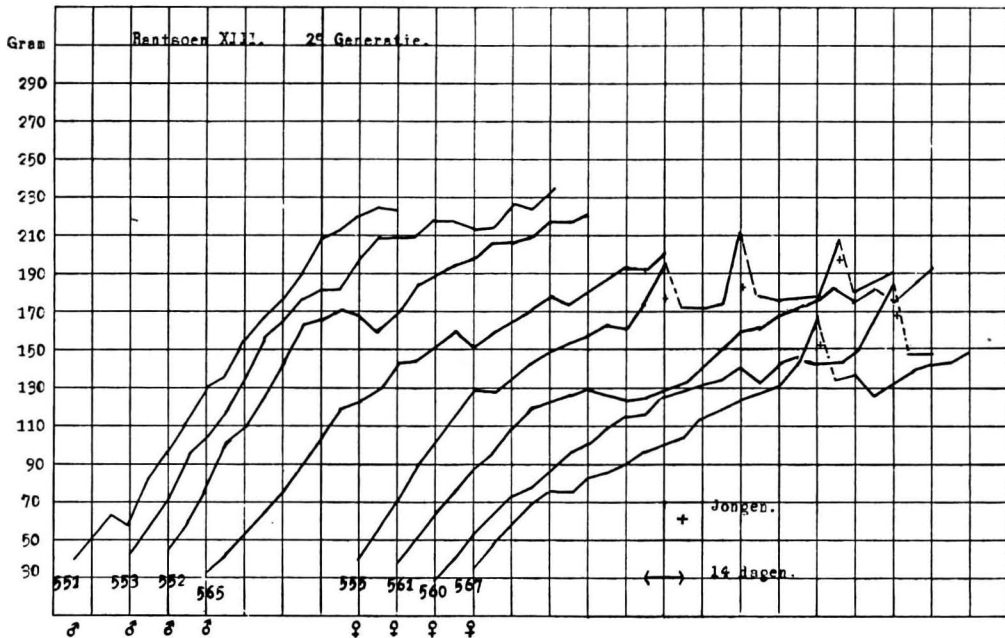
Rantsoen XIII = Ration XIII. 1e Generatie = 1st Generation.



14 dagen = 14 days. Ratten op normaal voer = Rats on normal diet. Jongen = young.

Fig. 2.

Rantsoen XIII = Ration XIII. 2e Generatie = 2nd Generation.



Jongen = young. 14 dagen = 14 days.

Fig. 3.

These were divided in 2 lots, the first getting the same diet as before, while for the second lot the whole wheat meal was not digested with acetone (ration XIIIa).

In both lots growth was normal. Of a number of the first growth curves have been reproduced in figure 3. Of the second lot, that grew as

TABLE 2.
Diet XIII. 1st generation.

Females	Males	Number of young	Weaned
479	489	9	3
482	486	10	9
484	478	7	0
484	486	4	3
487	480	2	0
487	486	3	0
488	481	8	7
497	458	8	8
		51	30

TABLE 3.
Diet XIII. 2nd generation.

Females	Males	Number of young	Weaned
550	565	6	0
555	565	9	0
555	565	6	0
555	553	6	0
560	552	5	0
567	552	8	3
568	553	8	0
568	553	7	0
		55	3

N.B. The 3 young from this litter grew very slowly. They could not be weaned before the seventh week. On normal diet this happens within 4 weeks.

fast, we added no curves to spare space. Table 3 shows the effect of matings in the first, table 4 of those in the second lot.

TABLE 4.
Diet XIIIa. 2nd generation.

Females	Males	Number of young	Weaned
549	558	1	0
554	563	9	0
554	563	5	0
564	557	abortus	
566	558	6	0
566	558	8	0
566	559	8	0

We see two rations, from which the first unables the mothers in the first generation immediately, the other in the second, to rear their young, while fertility in the males remains unchanged and that of the females, as far as to produce living young is considered, is but very little hampered.

That the animals fed on diet XIIIa were unable to rear their young, astonished us, for American investigations, we reported in our former communication, are in favour of a fertilising vitamin in wheatembryo.

In every case it is clear, that we can not speak of a single fertility controlling factor, but that different foodstuffs are wanted for the function of the testis, than for that of the milklands.

In a minute investigation on histological changes in sterile rats KARL E. MASON¹⁾ used the following ration to make male rats sterile: casein 18, starch 54, lard 15, butterfat 9, saltmixture 4 plus yeast tablets 0.4 gr.

Addition of 40 gr. fresh lettuce prevented sterility, as in the case of BARNETT SURE.

We are continuing our observations with different diets, to see if it is necessary to postulate still other specific substances that are indispensable for the function of other organs playing a role in reproduction.

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¹⁾ K. E. MASON: A histological study of sterility in the albino rat due to a dietary deficiency. Proceedings Nat. Acad. of Sciences July 1925. Vol. 11.