

FERTILITY IN RABBITS RECOVERING FROM MYXOMATOSIS

By W. R. SOBEY* AND K. TURNBULL†

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Summary

The fertility of 20 bucks and 13 does which recovered from an infection of myxoma virus, strain KM.13, under laboratory conditions was examined. Six months after infection, only 50 per cent. of the bucks were found to be fertile and many of these were not fully fertile. Three females were found to be infertile, of which one could be bred from by using artificial insemination, but the fecundity of the remainder was unimpaired. The reduced fertility observed under laboratory conditions is not necessarily a reflection of field conditions where most of the infertile animals may not survive.

I. INTRODUCTION

In the course of a selection programme for a line of rabbits resistant to the KM.13 strain of myxoma virus, the fertility of all animals recovering from the disease was examined as a pre-requisite to selection. This paper deals with the observed fertility of 20 bucks and 13 does which have recovered in this Laboratory during the past 12 months.

II. MATERIALS AND METHODS

The rabbit colony was housed in two, large, well-ventilated, unheated rooms. The breeding stock was genetically heterogenous, including both domestic and wild rabbits. Animals forming part of the selection programme were infected at between 4 and 5 months of age by inoculation with about 10 ID₅₀ strain KM.13. After infection, animals were observed daily for a period of 60 days, after which the surviving animals were examined weekly with respect to fertility. It was found possible to classify the severity of the symptoms shown by an infected rabbit into three main classes, based on the general physical condition of the rabbit and the time after infection at which it can safely be judged to have recovered. They are as follows:

“+”—A mild attack with no marked loss of condition, and a marked localization of lesions wherever they erupt at the skin surface. Animals of this group can be predicted as recoveries about 24 days after infection.

“++”—More severe attack, loss of condition, and no localization of lesions. Prediction of recovery cannot be made before 34 days after infection.

“+++”—Severe attack, generalization of the disease with marked loss of condition, and prediction of recovery impossible before 44 days after infection.

Having been classified as recoveries, rabbits were examined periodically for sexual interest. Does were presented to a healthy buck and their acceptance or refusal of the buck during a period of about 15 min used as an index of sexual interest. Recovered bucks were presented with a healthy female and their interest judged on

* Animal Genetics Section, C.S.I.R.O., University of Sydney.

† Animal Genetics Section, C.S.I.R.O., Sheep Biology Laboratory, Prospect, N.S.W.

whether or not they will mount during a period of about 15 min. As soon as bucks displayed sexual interest, they were introduced to an artificial vagina, similar to the

TABLE 1
GRADATION OF BUCKS INTO DIFFERENT CATEGORIES AFTER SPERM EXAMINATION

Category	Sexual Interest	Ejaculate	Remarks
1	—	—	No sperm Sperm present, non-motile, <i>infertile</i> Sperm present, sparse, motile, <i>intermittently fertile</i> Plentiful motile sperm, <i>fully fertile</i>
2	+	—	
3	+	+	
4	+	+	
5	+	+	
6	+	+	

one described by White (1955), used in conjunction with a teaser doe. The ejaculate, when present, was examined microscopically after dilution in 0.9 per cent. saline. Bucks were graded into categories 1-6 (see Table 1).

TABLE 2
COMPARISON OF MEAN LITTER SIZE FOR BUCKS FALLING INTO CATEGORIES 5 AND 6 AT DIFFERENT TIMES

Rabbit No.	Category 5			Category 6		
	Mean Litter Size	No. of Matings Without Conception	Total No. of Matings	Mean Litter Size	No. of Matings Without Conception	Total No. of Matings
131	2.5	4	6	7	0	3
145	3.0	2	5	5.5	0	2
189	3.0	0	1	6.5	0	4
257	3.5	1	3	6.6	0	3
681	3.25	0	4	5.8	0	9
695	3.5	2	4	7.0	0	8
783	—	—	—	6.2	0	5
930	3.75	1	5	7.1	0	6
155A	1.0	0	1	6.9	0	8

III. RESULTS

The difference in relative fertility between category 5 and category 6 bucks is contrasted in Table 2 where the fertility of the same bucks falling into either of the two categories at different times is compared. The difference between mean litter size, ignoring the matings without conception, is significant ($P < 0.02$). The mean litter size for bucks in category 6 is 6.58 ± 0.19 , and mean litter size for those in category 5 is 3.16 ± 0.21 , $t_7 = 3.22$.

Using the scale in Table 1, the data collected for bucks are set out in Table 3. The animals to the right of the table had fewer semen collections recorded as they were more recent recoveries. It is apparent that not all bucks become fertile even 6 months after recovering, some showing no sexual interest at all. Of those which did become fertile, only two appeared consistently fully fertile, of which one, No. 155A, had been examined for a period of 6 months, and one, No. 783, for a period of 12 months.

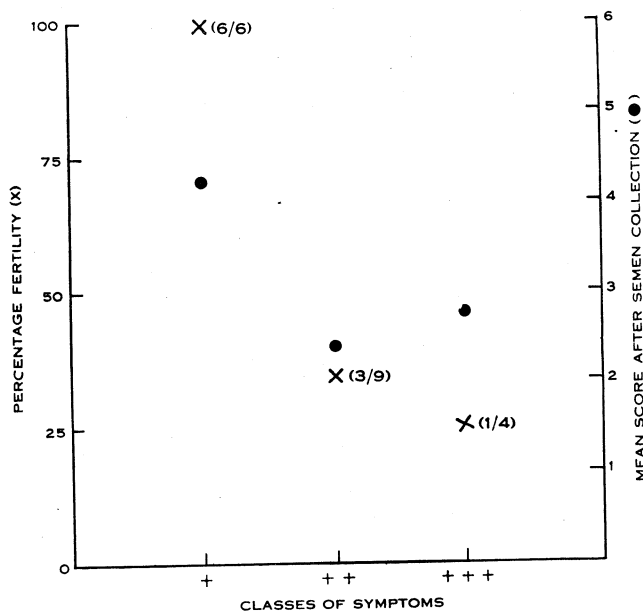


Fig. 1.—Change in percentage fertility (X) and mean score (●) in relation to the severity of the symptoms. Rabbit No. 436A (see Table 3) has been excluded since it has not been tested over a period of 6 months.

The severity of the disease in bucks which eventually recovered appeared to have a marked influence on fertility. At 6 months after infection, the number of fertile bucks in each of the three classes of symptoms were plotted in Figure 1 as percentages against these classes. Both categories 5 and 6 (Table 3) are classified as fertile. The mean scores of each class, where score is the category number as in Table 1, are also given. The data are too limited to differentiate between “++” and “+++” classes both of which display markedly reduced fertility, but the difference between these two classes and the “+” class, which is almost fully fertile, is quite clear.

The fertility of does recovering from the disease was much less variable than bucks. Of the 13 animals under observation, shown in Table 4, two were infertile, one being tested over a period of 12 months and one over 6 months. One doe, No. 607, refused the buck during the 8 months under test but proved fertile when artificially inseminated. As routine artificial insemination involves the injection of 100 units

TABLE 3 (Continued)

Rabbit No.		131	145	147	188	189	257	588	605	681	748	783	930	168A	173A	235A	151A	155A	158A	357A	436A
Severity of reaction		++	+++	+++	++	++	+++	+++	++	++	++	+	+	++	++	+	++	+	++	+	++
Months	Weeks (approx.)	Semen Tests after Infection																			
8	1	6	5			3	5						6	5							
	2		5	2		3															
	3	3			1		3														
	4																				
9	1	3	6	1		3						6	6								
	2			1	1																
	3	3			1	3	3														
	4																				
10	1	6	6	1								6									
	2																				
	3																				
	4	3																			
11	1	6	6					3													
	2		6				3														
	3		6									6									
	4	3	5																		
12	1																				
	2																				
	3																				
	4	5										6									
Mean score at 6 months		3.5	2.7	1.5	1.0	4.2	4.5	2.5	4.5	5.2	2.0	5.2	5.1	2.8	1.9	1.8	2.1	4.8	1.0	4.0	1.5

of gonadotrophin to ensure ovulation, the natural fertility of this doe is in some doubt. All the other does were fully fertile by 5 months, accepting a buck normally. The fecundity of the recovered does which breed did not appear to be affected. Their mean litter size of 5.71 ± 0.49 was not significantly different from that of control animals— 6.14 ± 0.26 , $t_{95} = 0.754$.

TABLE 4

FERTILITY OF DOES UP TO 12 MONTHS AFTER INFECTION IN RELATION TO THE SEVERITY OF THE DISEASE

Doe No.	445	608	157	437	127	134	136	128	191	715	923†	132‡	607
Severity of reaction	+	+	+	+	++	++	++	++	++	++	++	+++	+++
Months	Weeks (approx.)	Time after Infection to Birth of First Litter (denoted by asterisk)											
2													
3	1			*									
	2												
	3	*											
	4												
4	1												
	2												
	3			*		*	*			*			*§
	4												
5	1		*		*			*	*				
	2												
	3												
	4												

† Doe No. 923 infertile after 6 months under test.

‡ Doe No. 132 infertile after 12 months under test.

§ Litter born only after artificial insemination.

IV. DISCUSSION

Fenner *et al.* (1953) and Marshall *et al.* (1955) found no effects on the fecundity of females in large samples of field recoveries, and to this extent the present data are in agreement. Unfortunately their sampling methods would not disclose completely infertile females, and no estimate of their occurrence under field conditions can be made. It is conceivable that under the more rigorous conditions prevailing in the field, only the “+” and possibly some of the “++” classes would survive. Under such circumstances few infertile animals would be encountered, although some of the bucks would probably be only intermittently fertile. This would tend to work against the spread of genetic resistance where recovered bucks are in competition

with bucks that have never been infected, but will increase the selection for resistance in areas where infection is complete.

V. REFERENCES

- FENNER, F., MARSHALL, I. D., and WOODROOFE, GWENDOLYN, M. (1953).—*J. Hyg.* **51**: 15.
MARSHALL, I. D., DYCE, A. L., POOLE, W. E., and FENNER, F. (1955).—*J. Hyg.* **53**: 12.
WHITE, I. G. (1955).—*Aust. J. Exp. Biol. Med. Sci.* **33**: 367.

