FEEDING AND BREEDING OF LABORATORY ANIMALS

VIII. BREEDING OF GUINEA-PIGS

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(With 6 Figures in the Text)

Guinea-pigs are usually mated in permanent polygamous groups, one or more males with a large number of females, the young being harvested when ready to wean. This system is economical of labour, and is efficient in allowing of mating at post-partum oestrus and therefore of maximum reproductivity. There are, however, serious disadvantages; it is difficult to keep track of individual performance and difficult therefore to eliminate unproductive sows, the ancestry and exact age of the young are often unknown, and the conditions of rearing young among a crowd of adults are probably not ideal. These considerations suggest that, given high-grade breeding stock, the polygamous system is adequate, and probably inevitable, for the mass production of young for experimental purposes, but that it leaves much to be desired for the production of breeding stock. The obvious solution of this difficulty is to maintain a large polygamous and anonymous colony for mass breeding, and, quite separately, a small closely recorded colony to supply the breeding animals. A good sow should produce at least 10 young per year in a life of 2 years. A demand of 10,000 animals per year, for experimental work, therefore requires a mass-breeding stock of 1000 sows, an annual replacement of 500 sows and a stock-breeding stock of 100 sows. According to our experience, about 2 hr. daily on the part of a trained technician would be required to maintain close recording of such a pilot stock and of its progeny to puberty (Bruce & Parkes, 1947*b*).

Either of two systems of breeding might be applied to the pilot colony; mating in small polygamous groups, the sows being removed before parturition and returned after weaning, or mating in permanent monogamous pairs. The former has the disadvantage of allowing no estimate of potentiality for post-partum conception, a factor which will much influence the productivity of the mass-breeding colony. We have, therefore, investigated the use of the monogamous system for guinea-pigs, and especially for a small pilot colony designed to supply fully recorded replacement stock to a mass-breeding colony. The work was undertaken largely to gain experience. The factual results were similar in many ways to those recorded by Sewell, Wright (1922), Haines (1929, 1931), Eaton (1932, 1941), and Durham & Woods (1932), and are here given only in summarized form.

The colony was started with 12 pairs of guinea-pigs from the Medical Research Council's colony at Mill Hill. These animals were replaced as soon as possible by indigenous young of known history, and the colony was stabilized at 42 breeding pairs in about a year. Each pair was housed in a wire cage $20 \times 15 \times 12$ in., with a deep tray. The animals were fed on the pelleted food already described (Bruce & Parkes, 1947*a*) and greenfood, hay, and water from water bottles. Attempts, in a separate experiment, to discard the hay were unsatisfactory because of the apparent increase in maternal mortality and stillbirth rate. The records of the colony were transferred to the Cope-Chat cards already described (Bruce & Parkes, 1947*b*) in a previous paper, in which some of the administrative details for the first year of the colony were also given.

In its second year the colony of 42 breeding pairs, housed separately in cages arranged in 3 tiers, produced 588 weaned young in a small room 15×12 ft., i.e. 14 weaned young per female, and 4·4 young per square foot of floor space. These figures are not necessarily maximal, but they are much better than those usually obtained from large polygamous breeding pens. The labour required by the monogamous system is, of course, much greater.

The main results from 1240 young comprising 324 litters were as follows:

(*a*) There was little seasonal variation in productivity, as measured by the total young weaned from a constant number of does (Fig. 1). The slight increase late in 1946 is of doubtful significance. Comparison of the results of Sewell, Wright (1922) and Durham & Woods (1932) suggests that the most likely cause of seasonal variation is variation in the amount and quality of greenfood. The colony recorded here was supplied lavishly all the year round with high quality cabbage.

(*b*) Litters of 3 and 4 were most frequent (Fig. 2)

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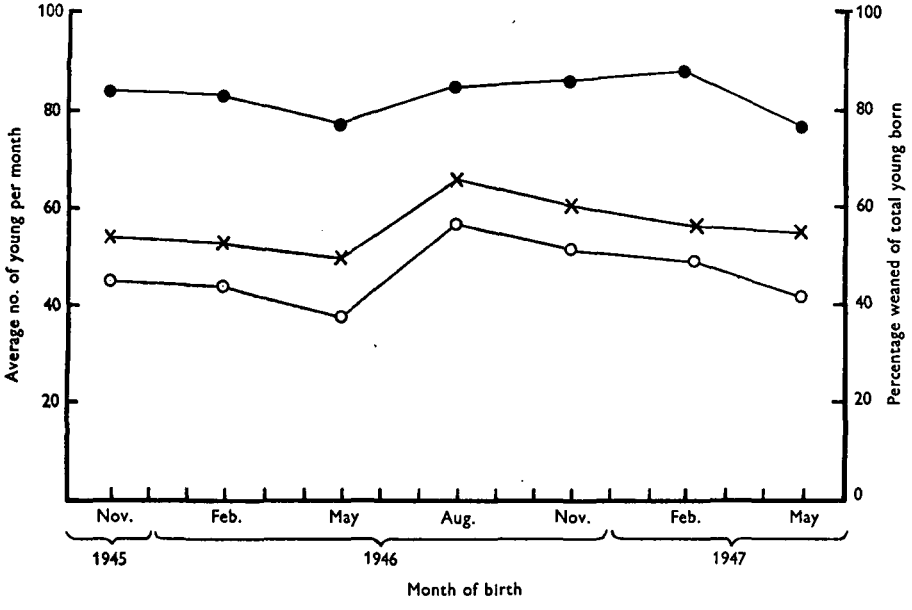

Fig. 1. Average production of young per month, calculated for successive 3-monthly periods from 42 pairs of breeding animals. ×——×, young born; ○——○, young weaned; ●——●, percentage of young weaned of total number born.

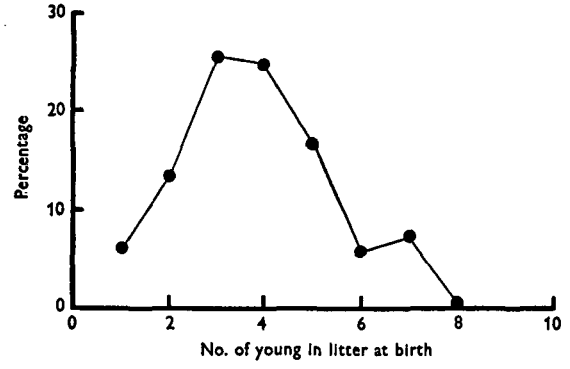

Fig. 2. Frequency of litter size at birth.

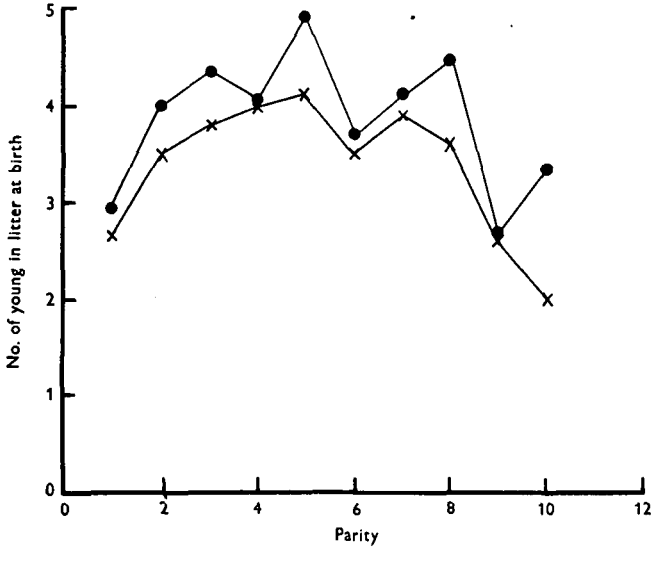

Fig. 3. Effect of parity on average litter size. ●——●, all litters; ×——×, litters of which all young were raised.

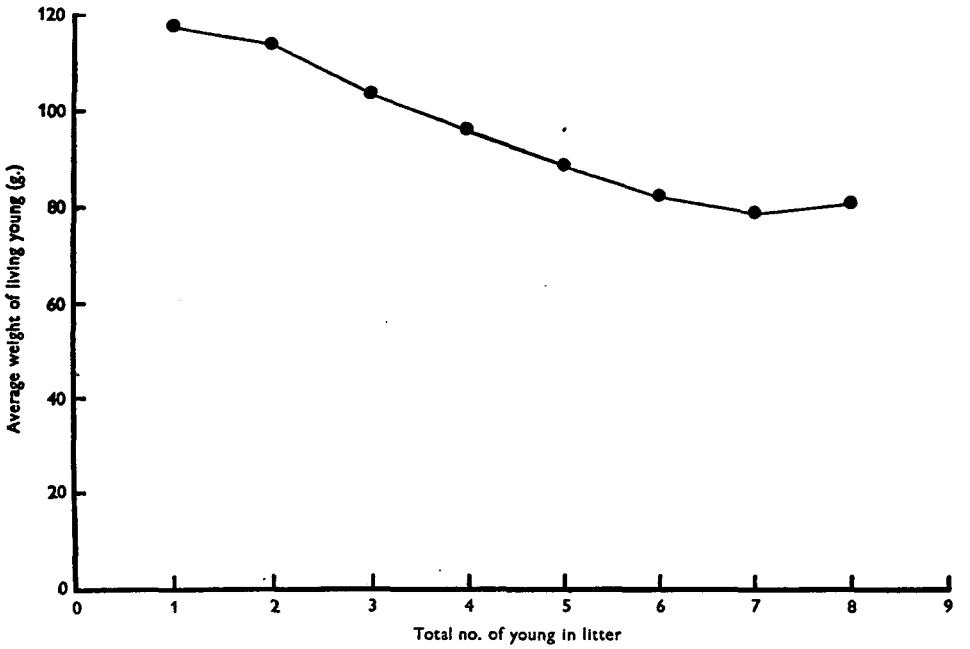

Fig. 4. Litter size and average weight of living young at birth

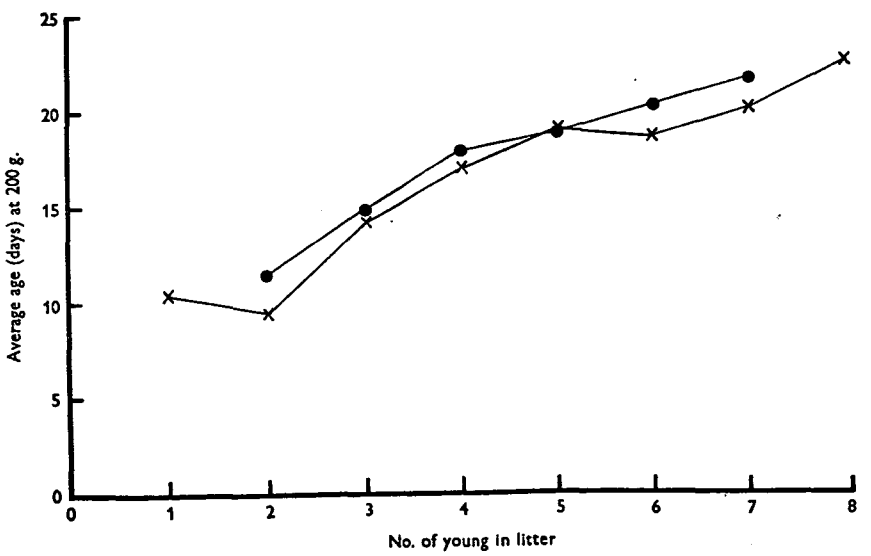

Fig. 5. Growth of young from birth to weaning. ●——● litters of which all young were raised; ×——×, litters of which some young died before weaning.

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The average litter size (3·8 at birth) was little affected by order of litter (after the first), by age of mother (Fig. 3) or by season.

(*c*) Birth weight and rate of growth were inversely proportional to the size of litter (Figs. 4, 5).

(*d*) 69 % of all litters born were weaned without loss, and 85 % of young born were reared.

(*e*) The total mortality of young before weaning at 200 g. was 15·4 %. This was little affected by season, parity, or age of mother, but was closely related to litter size (Fig. 6). The sex-ratio at birth was high, 123 ♂ per 100 ♀, but it was much reduced by weaning time by differential mortality of the males; 187 ♂ per 100 ♀ died before weaning.

(*f*) Fertile mating took place at 74% of post-partum oestrus periods.

We are glad to have had the opportunity of discussing our results with Dr I. W. Rowlands, Wellcome Veterinary Research Station, Frant, who is studying similar problems.

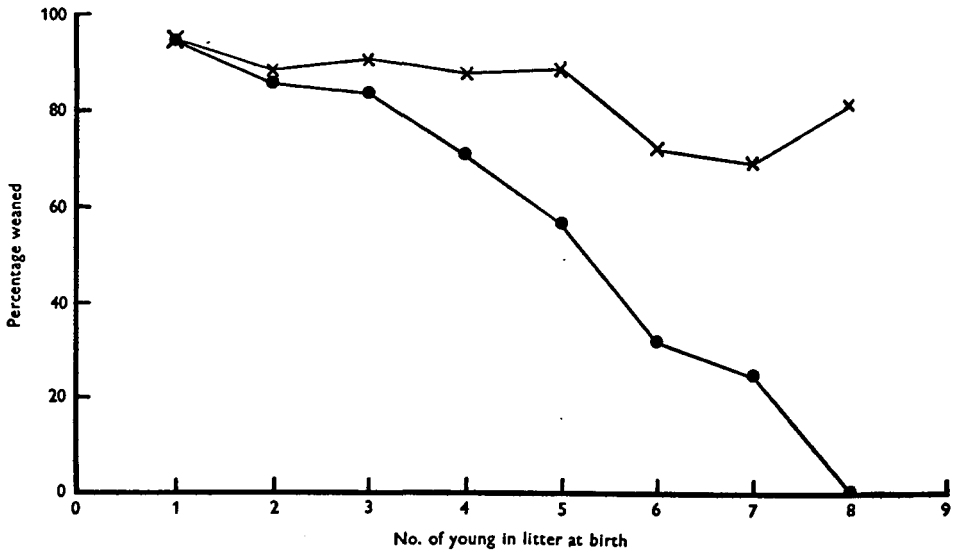

Fig. 6. Litter size at birth and mortality of young before weaning. ●——●, litters; ×——×, young.

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