BRIEF COMMUNICATION

ARTIFICIAL INSEMINATION IN QUAIL
AND THE PRODUCTION OF CHICKEN–QUAIL
HYBRIDS

A. M. McFARQUHAR* AND P. E. LAKE

A.R.C. Poultry Research Centre, King's Buildings, West Mains Road, Edinburgh 9

(Received 15th June 1964)

Intra-uterine insemination produces better fertility than intra-vaginal insemination when breeding quail by artificial insemination (Wentworth & Mellen, 1963; Ogasawara & Huang, 1963). Insemination is best accomplished when an egg is present in the uterus. Wentworth & Mellen (1963) passed a needle through the postero-dorsal wall of the cloaca, the uterus wall and the egg, and injected semen into the anterior region of the uterus. Antibiotics were added to the food and to a semen diluent to prevent serious infection of the females by *E. coli*. Ogasawara & Huang (1963) expelled the egg from the uterus before depositing the semen therein. Good fertility was obtained without the use of antibiotics and infection of hens was not reported.

The present communication reports a simple yet successful method of artificial insemination of quail without expelling the egg from the uterus. It was developed in an attempt to produce chicken–quail hybrids with the semen of Brown Leghorns.

Japanese quail aged between 2 and 7 months were maintained in individual cages and fed a turkey starter ration. Automatically controlled lights provided a 14-hr day. Brown Leghorn males of the Breeding line (Blyth & Sang, 1960) were kept under similar conditions but were fed a normal chicken breeders' mash.

Brown Leghorn semen, uncontaminated with transparent fluid and urine, was collected by the method described by Lake (1957). Quail semen was collected by the method of Ogasawara & Huang (1963), except that massage was also applied to the back of the bird. Urine and semen of the quail could be distinguished when the erected copulatory organ was squeezed, because urine was invariably chalky-white and sometimes granular compared with the creamy-white, homogeneous nature of semen which appeared in the centre of the spade-like organ.

Intra-uterine insemination of quail hens was carried out by a modification of the method of Ogasawara & Huang (1963). The oviduct was everted until the egg shell became visible, then the tip of the inseminating cannula was placed

* Present address: Matthews Turkey Breeding Research Ltd, Gt. Witchingham Hall, Norwich, Norfolk.

against it and contact was maintained while the oviduct was allowed to revert to its normal position. The semen (0.005 ml quail or 0.02 ml chicken) was then discharged by gentle blowing and the greater part was thus transferred to the posterior part of the uterus. With the larger volume of chicken semen it is possible that a portion of it spilled into the uterus-vagina junction.

Eggs from the hens which had received quail semen were collected daily for a period of 10 days, and, for most of the investigation, incubated for 10 days and broken out. The eggs laid during the latter part of the study were allowed to hatch. All eggs from chicken-quail crosses were allowed time to hatch. The number of fertile eggs (dead and viable embryos) and the period of fertility persisting in each hen after single inseminations were noted. The data for average fertility produced by chicken and quail semen were calculated for different periods after single inseminations (Table 1), so that they might be

TABLE 1
FERTILITY DATA AFTER INSEMINATION OF QUAIL HENS WITH QUAIL OR CHICKEN SEMEN

Semen type	No. hens	Fertile hens (%)	Fertile eggs (%)				
			Days 1 to 10	Days 2 to 10	Days 1 to 5	Days 2 to 5	Days 2 to 6
Quail	12	100	38.5 (96)	42.5 (87)	73.5 (49)	90 (40)	71.2 (52)
Chicken	52	40	15.2 (244)	15.3 (215)	20 (150)	21.5 (121)	19.3 (145)

Numbers in parentheses are the numbers of eggs laid during the particular period

used for comparison with the various computations appearing in the literature on birds. With quail semen no fertile eggs were laid on the 1st day or after the 6th day (the fertility period varied from 3 to 5 days; average 3.8). With chicken semen five out of fifty-two quail hens laid fertile eggs up to the 9th day. The longer fertility period produced in the latter cases may have been due to the greater amount of semen (0.02 ml) used.

Quail semen produced excellent fertility, using a simple technique and a dose of 0.005 ml semen, provided the inseminations were carried out every 6th day. Under these conditions the results compare favourably with weekly inseminations normally practised with chickens. Complete hatchability data were not available because at the beginning of the experiment eggs were broken out after 10 days' incubation to test for fertility only. However, in the latter part of the investigation all the eggs were allowed sufficient time to hatch and 71.2% of those set produced viable chicks. A few hens, laying least intensively, were disturbed by the process of intrauterine insemination because egg-laying was interrupted for 1 or 2 days after the manipulations. However, the production of soft-shelled eggs, widespread lowered egg production, high infection and death rates amongst hens, as experienced by Wentworth & Mellen (1963) were never encountered. The average duration of fertility in each hen after a

single insemination was similar to that reported by Wentworth & Mellen (1963). These authors did not give data for egg fertility but only the percentage of hens which became fertile; it was lower than that obtained in the present work. The fertility results obtained during Days 1 to 10 inclusive were the same as those of Ogasawara & Huang (1963) for Days 2 to 11 inclusive. A few hens, without an egg in the uterus, were inseminated into the vagina; out of twenty-three eggs laid during Days 2 to 5 inclusive only three were fertile, which is in agreement with observations made by Ogasawara & Huang (1963).

When quail hens were inseminated with Brown Leghorn semen thirty-seven eggs produced embryos, twenty-one of which died before 5 days of incubation and twelve before 15 days. Four hybrid chicks hatched on the 19th day of incubation but died within 2 days. The fertility achieved was above that reported by Wilcox & Clark (1961) using the semen of White Leghorn, Flightless and Dark Cornish breeds of chickens on quail but lower than that of Ogasawara & Huang (1963) who used Jungle Fowl semen. It would be of great interest to establish whether the variable results, which have been obtained in attempts to produce chicken-quail hybrids, are due to the different breeds of chicken used or the different experimental techniques.

REFERENCES

- BLYTH, J. S. S. & SANG, J. H. (1960) Survey of line crosses in a Brown Leghorn flock. 1. Egg production. *Genet. Res.* **1**, 408.
- LAKE, P. E. (1957) Fowl semen as collected by the massage method. *J. agric. Sci.* **49**, 120.
- OGASAWARA, F. X. & HUANG, R. (1963) A modified method of artificial insemination in the production of chicken-quail hybrid. *Poult. Sci.* **42**, 1386.
- WENTWORTH, B. C. & MELLEN, W. J. (1963) Egg production and fertility following various methods of insemination in Japanese quail (*Coturnix coturnix japonica*). *J. Reprod. Fertil.* **6**, 215.
- WILCOX, F. H. & CLARK, C. E. (1961) Chicken-quail hybrids. *J. Hered.* **52**, 167.