The Storage of Fowl Semen at Low Temperatures

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The early successes in the field of deep freezing were carried out on fowl semen and were reported by Polge (1951). The incorporation of glycerol in the diluent permitted complete resumption of motility on thawing the sperm from the frozen condition but rendered the sperm infertile even if they had not been frozen.

Polge found that slow removal of the glycerol from unfrozen semen by dialysis permitted sperm, so treated, to retain normal fertilising capacity. Subsequently he reported that, when frozen glycerolised semen was dialysed 61 per cent. of the hens inseminated laid some fertile eggs. Fertility during the first week after insemination was 54 per cent. and hatchability of fertile eggs 71 per cent.

This work has been repeated at the Poultry Research Centre with similar results. Polge's report of 54 per cent. fertility gives a too optimistic picture as this percentage refers apparently only to the 61 per cent. of hens laying fertile eggs, whereas under normal conditions of artificial insemination practically all hens produce fertile eggs and fertility results obtained are between 80-90 per cent. The technique is thus not adequate for field use.

Allen and Bobr (1955) used the method of intra-uterine insemination and found that unfrozen glycerolised semen inserted directly into the uterus, rather than the vagina, resulted in a fertility of 73 per cent. instead of nil. As this is a simpler and less time consuming technique than dialysis it was applied later with frozen undialysed semen. A total of 41 hens was inseminated. The results are set out in Table I.

TABLE I.

Results Following Intra-uterine Insemination of Frozen Undialysed Semen.

Classification	No. of hens	Eggs	
		Total set	% fertile
No eggs	1	—	—
All eggs infertile	21	73	0
Some eggs fertile	19	55	58
Total	41	128	25

Of the total of 128 eggs set, 25 per cent. were fertile, but if the completely infertile hens are discarded from the calculation 58 per cent. would be the fertility obtained. This latter figure

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is comparable to Polge's result with dialysed semen. Fertility was determined by breaking the eggs after 48 hours incubation, consequently hatchability was not measured. As the majority of the embryos were dead even at this early stage of development, hatchability of fertile eggs was very much lower than the figure of 71 per cent. obtained by Polge.

The loss of fertilising power of glycerolised sperm was attributed by Polge and his co-workers (Parkes 1956) to be due to osmotic damage in the oviduct and this view is substantiated by the improvement obtained when the semen is dialysed. Although the fertility we obtained from frozen undialysed semen inseminated directly into the uterus was low, the fact that some fertility from undialysed semen was obtained indicates that factors other than osmotic shock are involved or that the effects of osmotic shock can be given further interpretation. In this regard we noticed that although frozen undialysed semen resumed full motility on thawing, there was a rapid decline in motility thereafter. Allen and Grigg (1957) showed that motility, as a factor in sperm transport in the fowl, is more important in the vagina, than it is at higher levels of the oviduct. It is therefore suggested that the rapid decline in motility of thawed sperm is a factor in the sterility of frozen fowl semen inseminated by the intravaginal route without dialysis.

References

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