The placentae of the tolerant group are smaller than those of the control hybrids, the difference being significant ($P < 0{\cdot}001$), allowance for litter size being unnecessary as it is nearly the same in both groups. Also, the placental weights of the tolerant group do not differ significantly from those of the control inbred group, and if allowance is made for difference in litter size, they would tend to be even smaller.

The placentae of the immune group are larger than those of the control hybrids ($P < 0{\cdot}001$), allowance for litter size again being unnecessary.

These results confirm the finding that hybrid foetuses tend to have larger placentae than pure-bred foetuses in *C57BL* mothers. They further show that prior immunization of the mother to the paternal antigens results in a significant increase in placental size whereas, in mothers rendered tolerant of the paternal antigens, the placentae are significantly smaller than in untreated mothers, and are indeed as small as, or possibly even smaller than, those of inbred foetuses in similar mothers.

Since the foetuses in the tolerant, immune and hybrid control groups were genetically similar with respect to the relation between mother and foetus, the observed differences in placental size must be due to the experimental condition of the mothers, depending on whether she was tolerant, immune or untreated. The tolerant mothers differ from the control mothers only in that they lack the potentiality, which the untreated mothers possess, to react to the specific foetal antigens. The difference in placental size must therefore be due primarily to this difference in the mothers. Some reaction to the foetal antigens by the control mothers, that does not take place in the tolerant mothers, must account for the differences in placental size, presumably by providing in the controls a more favourable mucosal environment for the invasion of the trophoblast than in the tolerant animals.

Pre-immunization of the mother to *A2G* male antigens must result in some response of the uterine tissues to the implanting hybrid embryos which enables them to establish larger placentae. Whether this response is cellular or serological in nature, or both, is unknown.

It follows that, if placental size depends on the extent of trophoblastic invasion, the latter must be affected by the maternal response in such a way that it is more extensive in immune, and less extensive in tolerant, than in untreated mothers. Histological investigation of the placentae, when this can be completed, may throw light on the mechanism involved.

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Failure of some Hill Lambs to absorb Maternal Gamma-globulin

THE ability of rats to absorb proteins across the gut normally persists until 20 days of age, but can be ended earlier by the administration of certain corticosteroids[1,2]. As a result of this observation and an investigation of mortality data for suckling rats, it was suggested that a premature loss of absorption might be induced by mothers during stress[3]. Because of the severe winter of 1962–63 many hill ewes experienced long periods of undernourishment and climatic stress during pregnancy. The opportunity was taken, therefore, to examine lambs which died before weaning in hill flocks on the A.R.C. Animal Breeding Research Organization's farms at Stanhope and Blythbank in Peeblesshire. Post-mortem examination was by the procedures described by McFarlane[4]. Blood samples were taken from the hearts and the serum proteins separated by electrophoresis on paper for 16 h (2 m.amp/5 cm width) in a sodium barbiturate–sodium acetate buffer ($pH = 8{\cdot}6$; $\mu = 0{\cdot}1$) using 0·05 ml. serum samples. The strips were dyed with bromo-phenol blue and the concentration of each component measured with a photo-electric scanner.

Table 1. OCCURRENCE OF MILK IN THE GUT AND SERUM γ-GLOBULIN

Age when sampled (days)	Dead lambs without γ-globulin		Dead lambs with γ-globulin				Live lambs born indoors	
			Milk present		Milk absent			
	Milk present	Milk absent	No.	Ave. γ-globulin*	No.	Ave. γ-globulin*	No.	Ave. γ-globulin*
<1	3	12	2	17·0	3	6·7	5	28·4
1	9	7	5	19·7	4	9·5	5	35·2
2	9	1	10	18·3	4	9·1	6	36·3
3 or 4	7	1	15	18·7	2	7·0	15	32·3
5– 7	4	2	7	24·7	5	22·1	—	—
8–12	1	3	6	20·8	4	24·1	3	23·2
13–19	—	—	7	15·2	7	16·2	—	—
20–24	—	—	9	20·2	4	13·9	3	17·8
25–43	—	—	9	18·6	5	18·5	—	—

* Expressed as percentage of total serum proteins.

Observations were made on 259 lambs; 92 had died before, during or very shortly after birth and will not be considered further. Another 20 had died on the day of birth but had survived long enough to walk. Results from these and older lambs are summarized in Table 1, which includes, for comparison, average serum γ-globulin levels in healthy lambs which were born to ewes kept indoors and adequately fed during pregnancy. Normal lambs can absorb proteins only during the first 2 days of life, and any premature loss of this ability would have to be initiated *in utero*. As lambs are generally born without appreciable quantities of γ-globulin, the amounts of this component which have been absorbed from the colostrum can be easily determined in very young lambs, but analysis is complicated in older lambs by the presence of increasing amounts of autogenous protein.

Many of the lambs dying at ages up to 10 days had no γ-globulin in their sera. It would be expected that some new-born lambs would have no opportunity to suck because of desertion by the mothers or for other reasons. This partly accounts for the high proportion dying on the first day without absorbing γ-globulin. Over the rest of the period there were no significant differences either in the proportion with milk in the gut, or in the amount and distribution of the milk, between the groups of lambs with or lacking γ-globulin respectively. Some lambs dying during the first few days after birth had no milk, but low levels of γ-globulin; this may have been autogenous protein in some cases but in others was probably due to the ingestion of milk which was not detected at post-mortem examination. As the ages of the lambs increase, the presence of milk becomes decreasingly reliable as evidence that some was in the gut at the time when absorption normally occurs. It seems clear, however, that a considerable number of lambs obtained milk during this period yet failed to absorb any γ-globulin. All lambs in this category were born to Scottish Blackface ewes at Stanhope, a farm providing a particularly severe environment with mainly heather-covered hills rising to 2,700 ft. No additional features were observed which distinguished these lambs or their mothers from those of other groups.

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