

VARIATION IN AUTOIMMUNE RESPONSES TO ACTH-PROTEIN  
CONJUGATES IN SHEEP

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Chronic elevation of circulating glucocorticoids in response to persistent stress induces physiological changes that enable the animal to adapt to the adverse environment. In general these changes compromise the production efficiency of animals such as decreased growth rate and immunological function and increased lipogenesis, muscle protein catabolism and formation of wool breaks. The present study reports the efficacy of ACTH conjugated with either ovalbumin (OA) or human serum albumin (HSA) administered with Freund's adjuvants to induce humoral immune responses and suppress cortisol levels either under grazing or feedlot conditions. In experiments 1-4, grazing animals were either disturbed minimally (expt 1) or subjected to the chronic psychosocial stress of irregular disruption of social hierarchy by interchanging animals between flocks (expts 2-4) after weaning at 18kg LW. In expts 5 & 6 animals were maintained on a concentrate ration (16% protein) in a feedlot from 25 kg LW through to slaughter at 38 kg LW and subjected to the same psychosocial stress as described above. In each experiment, booster immunizations were administered sequentially at intervals of 6, 4, and 4 weeks after the primary immunizations. Blood samples were collected at and one week after each immunization. Antibody titres were determined by ELISA and cortisol by radioimmunoassay.

Exp	Conjugate	Antigen: Carrier	Genotype	Age at 1st inj (mths)	Peak Ab titre (1/Dil)	Cortisol (ng/ml) Imm;Ctl*	Final Ab titre (1/Dil)	Cortisol (ng/ml) Imm;Ctl*
1	ACTH:HSA	1:1	BLMxDH	3.3	68500	12.0;	68500	12.0;
2	ACTH:OA	1:2	BLMxDH	2.7	41354	10.4;49.2	11284	62.4;22.4
3	ACTH:OA	1:2	BLMxDH	1.5	39415	21.4;49.6	4817	22.5;27.5
4	ACTH:OA	1:2	MERINO	45.0	326057	4.9;35.5	87028	18.9;46.7
5	ACTH:HSA	1:1	BLMxDH	2.3	69175	9.7;12.4	69175	9.7;12.4
6	ACTH:OA	1:2	BLMxDH	2.3	59095	5.3;12.4	59095	15.3;12.4

\*Values for ACTH immune and control groups respectively.

The results demonstrate that the longevity of autoimmunity to ACTH antigens is dependent on either nutritional status, age, social well-being of animals or a combination of these factors. The density of ACTH functional epitopes in the protein conjugate is likely to be a further interacting factor since the ACTH:OA (1:2) antigen was unable to maintain high effective antibody titres for the duration of the experiment (see table). Since ACTH modulates lymphocyte function directly, it is possible that the failure to maintain high antibody titres under grazing conditions maybe due to the neutralisation of ACTH rather than the decrease in plasma cortisol levels.

This project was supported by the Meat Research Corporation

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