THE RESPONSE IN SHEEP OF PLASMA AND LIVER VITAMIN B_{12} CONCENTRATIONS TO COBALT PELLETS CONTAINING VARIOUS AMOUNTS OF COBALT OXIDE

J. D. McFARLANE, G. J. JUDSON, T. WOONTON, A. H. GOOD and A. MITSIOULIS

South Australian Dept of Agriculture, GPO Box 167 1, Adelaide, S.A. 5000.

A pellet containing 60% cobaltic oxide (CoO) and 40% iron powder was found to be effective in preventing vitamin B_{12} (VB_{12}) deficiency for the productive life of a sheep (Dewey et *al.* 1969). In 1979, the formulation of the commercial pellet was reduced to 30% CoO.

In recent years the effective life of the 30% CoO pellet has been questioned by veterinarians and primary producers. An experiment was conducted near Beachport in S.A. on a property where marginal VB_{12} deficiency occurs. Experimental Co pellets were made to contain 30%, 50% and 70% CoO (supplied by Top Australia Ltd). These were administered with a grinder and compared with a nil treatment and the original 60% SIROCO pellet in 2 year old Merino wethers. The wethers were allocated on the basis of liveweight to 1 of 5 groups, each of 10 sheep.

There was no liveweight response to treatment. Mean plasma and liver VB_{12} concentrations are presented in Table 1. The plasma VB_{12} concentrations reflect the increase in Co contents of the pellets when the untreated sheep had low plasma VB_{12} concentrations. The exception to this was the SIROCO group which after week 26 had significantly higher plasma VB_{12} concentrations than all the other groups. The liver VB_{12} concentrations were significantly higher in the SIROCO group than other treatment groups after week 38.

Table 1. Mean vitamin B_{12} concentrations in plasma (pmol/L) and liver (nmol/kg wet weight) of Merino wethers given cobalt pellets of different formulations

Mean values are for 10 sheep (plasma) and 5 sheep (liver)
Means not followed by the same letter within each column are significantly different ($P < 0.05$)

Treatment	Weeks after treatment (March 1989)							
	0	19	26	38	54	73	87	105
				Plasma concentration				
Nil	3260a	270a	230a	310a	1930a	790a	160a	1830a
30%	2920a	1080b	670b	520b	2520ab	1350b	380b	3110ab
50%	2470ab	2290c	1280c	700bc	2660b	2590c	1030c	2740a
70%	1890b	2650c	1610cd	1000c	2630b	2780c	1390c	3000ab
SIROCO	2990a	2260c	2330d	2040d	3920c	4230c	3580d	5110b
				Liver concentration				
Nil	750a	250a		130a	360a	400a	90a	360a
30%	600abc	290ab		210a	290a	340a	120a	300a
50%	470c	650c		400b	340a	430a	250b	340a
70%	470c	310ab		250a	270a	380a	200b	350a
SIROCO	560bc	620c	—	490b	470b	600b	400c	530b

As low VB_{12} concentrations (plasma <400 pmol/L, liver <200 nmol/kg) were not maintained throughout the experiment, the practical implications of severe Co deficiency are not clear. However, the experiment demonstrates that the 30% formulation does not maintain VB_{12} concentrations to the same levels as the SIROCO pellet and it does not significantly raise liver concentrations above those of untreated sheep. The 70% formulation was not as effective as the 60% formulation of the SIROCO pellet in increasing plasma or liver VB_{12} concentrations. The source of the SIROCO CoO was Tasmania. This source is now unavailable and the 30%, 50% and 70% pellets were made from South American or African CoO. This evidence would indicate that the crystalline form of the CoO is important in the solubility and longer term availability of Co from pellets.

DEWEY, D. W., LEE, H. J. and MARSTON, H. R. (1969). *Aust. J. Agric. Res. 20:* 1109-16.