

Coumestrol content of lucerne in the central west and hunter valley of New South Wales

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Continued breeding of lucerne in Australia should result in specialised lucerne cultivars which allow a wider use of lucerne than in pre-aphid Hunter River lucerne times. Resistance to foliar disease is one trait which receives some attention. This is not only important to maximise production and longevity, but also because when lucerne is stressed, usually due to foliar disease, the level of phyto-oestrogens including coumestrol can increase (1). When lucerne containing greater than 25 ppm coumestrol is ingested ovulation rate can be reduced in ewes (2) and irregular oestrus cycles and cystic ovaries may occur in cattle (3). During 1983-84 lucerne pastures in the central west and Hunter Valley of N.S.W. were regularly sampled and coumestrol levels determined.

Methods

Samples of a range of lucerne varieties were harvested from 30 dryland and irrigated paddocks between Cowra and Forbes at two monthly intervals from May 1983 to April 1984 and 22 samples of CUF 101 lucerne were sampled weekly from a site near Maitland in the lower Hunter Valley from November 1983 to May 1984. Coumestrol content was determined using thin layer chromatography (Isoflavone laboratory, Department of Agronomy, University of Western Australia). Leaf and stem portions were separated prior to analysis. Hunter Valley samples were scored for leaf disease (Scale 1-8).

Results and Discussion

Table 1. Coumestrol content (ppm) of irrigated lucerne in central N.S.W.

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Sample date	9/5/83	20/7/83	20/9/83	22/11/83	2/2/84	5/4/84
Leaf	1	7	3	10	44	10
Range	0-19	0-38	0-19	0-38	0-150	0-38
Stem	1	19	7	10	15	11
Range	0-19	0-94	0-38	0-38	0-112	0-38

Table 2. The coumestrol content t (ppm) of CUF 101 lucerne in the lower Hunter Valley 1983-84.

Month	November	December	January	February	March	April	May
Leaf	37	0	0	0	66	47	0
Range	37-37	-	-	-	0-150	0-112	-
Stem	0	0	0	0	37	28	0
Range	-	-	-	-	0-75	0-75	-

(†) Average of weekly samples.

Coumestrol levels of inland irrigated lucerne were often quite high (Table 1), levels being highest in early February after a very wet, humid summer when 45% of lucerne leaf samples contained more than 25 ppm coumestrol. Levels of inland dryland lucerne were usually negligible in the Hunter Valley 30% of the total sampled weeks resulted in lucerne with greater than 25 ppm coumestrol, and 46% of autumn weeks (Table 2). At this site coumestrol concentration was significantly related ($R^2 = 0.66$, $P < 0.001$) to leaf disease. These results support an earlier survey in coastal and central N.S.W. (4). While coumestrol levels overall are moderate, there may be times when isolated sites have unacceptable coumestrol levels and caution with breeding animals should be exercised.

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