Chemical application

Company stewardship of sheep ectoparasiticides

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Summary

Product stewardship of ectoparasiticides, and for that matter all products sold by an animal health company, should be considered an essential component in the overall management of a product portfolio. Stewardship is a term that encompasses many aspects of a product's management. This paper provides an overview, with some results, of stewardship work undertaken by Novartis Animal Health with the flystrike preventatives, CLiK® and Vetrazin®.

Keywords

Ectoparasiticide, blowfly, product, stewardship, CLiK®, Vetrazin®

Introduction

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This paper provides an overview, with some results, of stewardship work undertaken by Novartis Animal Health with their flystrike preventatives, CLiK® and Vetrazin®.

CLiK® contains the insect growth regulator (IGR), dicyclanil, a pyrimidin derivative and it was launched in Australia in 1998. The product is a low volume spray-on with the registered claims of preventing flystrike on the body, crutch and poll of treated sheep for 18-24 weeks. Sheep can be treated 'off shears', or with any length wool so long as the wool withholding period of three months is complied with.

Vetrazin® (cyromazine) is also an IGR product and was first registered as a powder more than 20 years ago. A liquid product (Vetrazin Liquid®) subsequently replaced this formulation and more recently, a spray-on formulation was added to the range (Vetrazin Spray-On®). The liquid formulation is registered for the prevention of flystrike on sheep with at least six weeks wool growth and can be applied, after dilution, through plunge and shower dips, automatic jetting races or hand-jetting equipment. The registered protection period is up to 14 weeks. Vetrazin Spray-On® is a ready-to-use formulation that confers 11 weeks protection against flystrike on sheep with at least six weeks wool growth.

In this paper, stewardship of these products will be discussed under several headings, viz. professional services, complaint management and education.

Professional Services

Example 1

In 1998, Novartis Animal Health purchased Young's Animal Health. Included among the newly acquired products was the diazinon-based pour-on lousicide, Eureka Gold®. This product is restricted to off-shears use and with CLiK®, also registered for use in this manner, questions about applying the products sequentially were soon being asked. There was no data available to support sequential application and therefore at the

time we were not prepared to recommend the practice. A study was completed to evaluate the use of these products in a sequential use situation. The treatment groups (n=10 newly shorn animals each) were:

Table 1. Treatment groups.

Group	Treatment
1	CLiK only
2	Eureka Gold only
3	CLiK applied first, followed by Eureka Gold
4	Eureka Gold applied first, followed by CLiK

All treatments were applied at registered dose rates. In the groups where two products were applied, application of the second product commenced 10 minutes after applying the first, thus simulating an 'on farm' situation where groups of 30-40 sheep would be treated at a time. Seven weeks after treatment, wool specimens were collected from the belly, the mid-flank and the backline of all sheep. The wool samples were subsequently analysed for diazinon and/or dicyclanil (and its main metabolite) (Table 2). Data from all groups was compared using the Kruskal-Wallis (KW) test and when this was significant, pairwise comparisons were performed using the Mann-Whitney test. P-values resulting from these procedures are shown in Table 3. Minimal quantities of the dicyclanil metabolite were found and this data is excluded from the table. The levels of diazinon residue at all sample sites were not significantly different between the treatment groups and are excluded from the table.

Table 2. Residues of dicyclanil in wool (mg/kg).

Treatment (group)	Sample site		
	Back	Flank	Belly
CLiK only (1)	144.5	261.1	230.5
CLiK / Eureka Gold (3)	51.7	114.8	245.0
Eureka Gold / CLiK (4)	41.7	120.1	282.8

Table 3. P-values for comparisons in Table 2.

Residue	Site	KW	1 vs 3	1 vs 4	3 vs 4	Conclusion
Dicyclanil	Back	0.0202	0.0753	0.0052	0.3930	4 < 1
	Flank	0.0037	0.0031	0.0022	0.9118	3 and 4 < 1
	Belly	0.7668	0.8534	0.6445	0.4813	

In this study, there were significant differences in the concentrations of dicyclanil from sheep that had been treated with only CLiK® versus those treated with both products and consequently, the sequential use of these products will not be recommended to graziers (Hosking and George, 2001). It is thought that some of the dicyclanil may have bound with the Eureka Gold® formulation and been removed from the sheep as surplus formulation dripped off them.

The larger quantity of dicyclanil residue recovered from the flank specimens, when compared with recoveries from back specimens, has not been seen in previous studies with long-wool sheep (Kearney and Ochudzawa, 1996; Smal and Chaophrasy, 1996). In these studies, where sheep were treated eight weeks after shearing, concentrations in back wool were consistently greater than in flank wool. Rainfall did not appear to influence this pattern. In the present study, dicyclanil residues on the belly were also unexpectedly high (Table 2). This is the first data reporting dicyclanil residues in belly wool. Given the results from the earlier studies (Kearney and Ochudzawa, 1996; Smal and Chaophrasy, 1996) where back and flank residues were determined it is considered unlikely that significant concentrations of dicyclanil would be in belly wool of sheep treated in long wool. The results from the off-shears study may indicate the migration of dicyclanil as a consequence of rainfall, or through its binding with lanolin after shearing, or a combination of these two factors.

Example 2

Over the past few years there has been considerable discussion on wool withholding periods for sheep ectoparasiticides. The National Registration Authority is currently conducting a review on this subject. Since dicyclanil is a relatively new active, there are limited field data available to understand its behaviour in the fleece. After consulting with the relevant experts, it was decided that reductions in wool withholding periods may be achieved with further 'hard' data that would reduce the reliance on assumptions presently being made through mathematical modeling. We therefore embarked on a multi-centred study with trial sites in summer, winter and non-seasonal rainfall zones.

Sheep distributed across the three sites were treated with CLiK® at six weeks, six months or nine months after shearing. A group of unshorn lambs was also included at one site and these were treated at 12 weeks of age. A sub-group of animals (n=6) in each treatment group is being 'band-sampled' at regular intervals after treatment to measure the dissipation of dicyclanil from the fleece. A second sub-group of 20 animals from each treatment group will be shorn with a 12-month fleece. The wool from these groups of sheep will be baled (by treatment group) and 'core-sampled' thus simulating commercial wool sampling procedures.

When the residue analyses are complete the data will be incorporated into the 'WoolRes' model (Campbell *et al.*, 1998) to determine appropriate withholding periods (or wool harvesting intervals) for CLiK®.

This data will be supported by that collected from the group of sheep treated with only CLiK® as described in Example 1. These sheep remained on trial with further wool samples collected at weeks 15 and 23 after treatment. The mean fleece concentrations of dicyclanil at seven, 15 and 23 weeks after treatment were lower than those predicted by the 'WoolRes' model (Horton and Campbell 2001), although the effect of rainfall (20.4 mm) in the 24 hour period after treatment needs to be considered (Table 4).

Table 4. Mean residues of dicyclanil (mg/kg wool) after off-shears treatment.

Week	Trial	WoolRes
7	238	366
15	35	55.1
23	0.6	10.2

Example 3

Mulesing remains a common practice throughout much of Australia. Ideally, graziers should mules lambs at times when blowfly pressure is non-existent. However, many graziers continue to mules at times when conditions are suitable for flystrike. Additionally, other graziers do make a concerted effort to mules when flies are not active only to experience a sudden shift in weather that promotes conditions suitable for fly activity, thus putting their lambs 'at risk'.

The treatment of lambs with a product that prevents flystrike following mulesing is therefore advisable. This in itself has posed problems as many of the currently registered products are failing to protect mulesed lambs whereas other products that could be suitable have the label restraint, "Do not use on open wounds, eg. those resulting from marking or mulesing operations". A large number of graziers and mulesing contractors now will not use the registered products because of inefficacy and it is not unusual to see various 'cocktails' being used. These cocktails generally comprise various concentrations of cyromazine, diazinon and a disinfectant, all combined in a canola oil (or similar) base.

A preliminary study was undertaken in 2000 to determine the potential of CLiK® as a mulesing wound treatment. While the fly pressure was very light at some sites, the results obtained have been encouraging enough for further studies to be planned for the forthcoming fly season (Table 5).

Table 5. Percentage of lambs struck on mulesing wounds within four weeks of mulesing.

Location	Positive control*	CLiK	Comments
Bribaree, NSW	1.1	0	Heavy fly pressure 3-4 weeks after treatment
Michelago, NSW	0	0	Cool, windy conditions
Rock Flat, NSW	0	0	Cool, windy conditions
Wallenbeen, NSW	0	0.3	Strikes recorded in other sheep suggest light fly pressure existed

* Lambs treated at mulesing time with a registered product or 'cocktail'

Complaint management

It is inevitable that some graziers will lodge complaints during the fly season, alleging that a product has failed to protect their flock for the registered protection period. Managing these complaints in a responsible and professional manner is a very important aspect of the animal health business. 'Resolving' a complaint by providing replacement product as compensation, even when the product used by the grazier is not the primary cause of the problem, is a practice that should be strongly discouraged.

In most situations, alleged failures of the IGR products to protect sheep from flystrike can be readily traced to extreme rainfall (moreso for the water soluble compounds) and/or poor application. In the case of diflubenzuron-based products, tolerance by organophosphate resistant blowflies (Kotze *et al*., 1997) should not be discounted. However, there are some situations where the technical representative of a company has to become a 'detective' and search thoroughly for the cause of the problem. The need for this often comes through inconsistent or incomplete information being provided by the complainant. Completing insecticide resistance tests or analysing wool for insecticide residues are two support tools that can be employed if necessary. Additionally, despite the comments above regarding the provision of product as compensation, re-treating a flock and monitoring the outcome is an important tool when linked with educating the grazier involved.

Two case studies of recent investigations are briefly discussed here to illustrate the problems that can occur when graziers operate outside registered application methods.

Case 1

Farmer A historically treated his sheep with Vetrazin Liquid applied through a 'fire fighting' unit with evidently good results. In the summer of 2000 he treated a mob of crossbred lambs with Vetrazin Liquid in this way but within three weeks of treatment 5.7% of the flock were suffering from flystrike over the shoulders or rump.

In this case we tested the wool and found concentrations of cyromazine of only 24-32 mg/kg on the shoulder and 26-100 mg/kg on the rump. This is less than is needed to obtain control of blowfly strike. When an animal is treated correctly (hand-jetted) with Vetrazin Liquid, the cyromazine concentration in the fleece (around the application site) four weeks after treatment should be in excess of 500 mg/kg.

Case 2

Farmer B had 4.9% of his flock struck within five weeks of treating with Vetrazin Spray-On. Approximately 150 mm of rain had been recorded through the period since treatment. The sheep were mainly struck over the shoulders and to a lesser degree around the rib cage and hips.

The grazier had used a gun designed to apply pour-ons to cattle in a narrow stripe, whereas Vetrazin Spray-On should be applied as 15 cm wide bands. Although in this instance the sheep had received the correct dose, it was not applied in a manner that permitted it to cover the sheep adequately.

Education

The education of company sales representatives, resellers and graziers is the final aspect of stewardship to be reviewed in this paper. It is surprising and disappointing to know how little some resellers and graziers know about parasite control, and we must always bear this in mind when discussing products and control programmes with them. Additionally, if Australia is going to continue to face the challenges of drug resistance by parasites, continued education is a very important component.

Resellers are the primary source of information for graziers and the reseller's training most often comes via the animal health companies. It is therefore vital that animal health company representatives are well trained in the theoretical and practical applications of the products they service, and those of their competitors.

An example of a novel training method that uses feedback from the audience is our interactive training programme ("Pursuit programmes"). At the end of each lecture module, the audience is asked a series of multiple choice questions to which they respond by recording their answer on a transmitter. A computer receives the signal from the transmitters and calculates the percentage of right and wrong answers. The presenter can immediately see the areas that some of the audience has failed to understand and reinforce those sections before moving to the next module.

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