

Integrating “best practice” chemicals use and residues management with regulation – a challenge for both the wool industry and the NRA.

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Note: The views expressed in this paper are those of the authors and do not necessarily reflect the position of the National Registration Authority for Agricultural and Veterinary Chemicals.

Summary

Growing concern about the residue implications of sheep ectoparasiticides as well the occupational hazards of using organophosphate sheep dips, pose a challenge to regulators such as the National Registration Authority for Agricultural and Veterinary Chemicals (NRA). Additional data requirements and restrictions imposed on the use of sheep ectoparasiticides, in order to meet contemporary OH&S, environmental and trade requirements, could restrict the range of products available to control lice and flies. This has implications for animal welfare and resistance management. With cooperation from all sectors of the wool industry, it may be possible to integrate “best practice” chemicals use and residues management with regulation and still maintain desirable pest management options. However, the proposed approach will impose significant responsibilities on all sectors of the wool industry. This innovative approach, together with the benefits likely to result from its implementation, are discussed.

Keywords

Residue management, best practice, NRA

Background

In ‘The Residue Implications of Sheep Ectoparasiticides’, Savage (1998) identified a number of potential problems associated with the residual pesticide on treated sheep and harvested wool, arising from the use of ectoparasiticides to control lice and flies. Concern was raised about the occupational hazard of pesticide residues on wool to shearers and other wool handlers, as well as the environmental impact of chemical residues on wool when discharged to the environment in scouring and other wool processing effluent.

Savage also discussed anticipated trade problems likely to develop as overseas wool processors respond to changing environmental standards, particularly in Europe and the UK, in response to the introduction of environmental standards (particularly the IPPC and other related water quality legislation). He concluded that significant restrictions on use of the sheep ectoparasiticides available at the time would have been required to ensure that Australian raw wool exported to Europe complied with anticipated environmental requirements.

On the basis of Savage’s report, the National Registration Authority for Agricultural and Veterinary Chemicals (NRA) decided to undertake a limited review of the sheep ectoparasiticides. That review was initiated in September 1999, and specifically targeted the occupational health & safety and environmental implications of chemical residues on wool arising from ectoparasiticides containing synthetic pyrethroids, diflubenzuron and triflumuron and all other long wool products. As most of Australia’s raw wool is processed overseas, the

review will also consider whether pesticide residues on wool unduly prejudice trade. A description of the NRA's review process is given in O'Brien (2001).

As mentioned in another paper by Ashton and O'Brien (2001), the NRA had earlier initiated two other "chemical specific" reviews of all products containing the active constituents chlorfenvinphos and diazinon as part of the Existing Chemical Review Program. The chlorfenvinphos review has now been finalised, while the diazinon review is nearing completion. The main outcomes of these reviews (NRA, 2000a; NRA, 2000b) that have affected or are likely to affect future use of these chemicals on sheep are described in Ashton and O'Brien's paper.

Shortly after the Savage (1998) report was released, the Institute of Occupational Medicine in the UK released a report (UK Institute of Occupational Medicine, 1999) that raised additional concern about the long term health implications of prolonged, low-level exposure of farm workers to sheep dips containing organophosphates. The NRA established a panel of experts to assess the implications of this report. The panel's conclusions (Expert Panel on Organophosphate Sheep Dips, 2000) and recommendations will also be considered in developing the regulatory outcomes for all the sheep ectoparasiticide-related reviews.

In responding to changing community expectations about chemical safety and marketing requirements with respect to residues, the NRA is often forced to make decisions that may adversely impact on the ability of producers to control pests and diseases. Restrictions on the use of organophosphate and synthetic pyrethroid ectoparasiticides because of trade concerns for example, may reduce the range of different types of pesticides available for lice and fly control and accelerate the development of resistance to remaining groups of chemicals.

In making decisions about chemical use, regulatory agencies such as the NRA tread a very fine line between meeting community and trade expectations on the one hand and the need of producers to have access to cost-effective ways of controlling pests and diseases. However, at the end of the day, the NRA must be satisfied that the criteria specified in the legislation have been met. Savage and Russell (1999) alluded to these issues. It is desirable that all sectors of the wool industry appreciate the role played by the regulator, why the regulation of the sheep ectoparasiticides represents a challenge to the NRA, and why industry cooperation is essential for the most satisfactory outcome.

What is the NRA's role and how is it implemented?

The NRA was established in 1993 by Commonwealth, State and Territory Governments to manage the National Registration Scheme. The scheme has achieved a consistent, national approach to agricultural and veterinary chemical registration, combining the separate schemes previously operating in each of the States. The NRA operates in accordance with the *Agricultural and Veterinary Chemicals (Administration) Act 1992* and the *Agricultural and Veterinary Chemicals Code Act 1994* (the Agvet Codes). An overview of the activities of the NRA is given in O'Brien (2001).

Before it can approve the use of a chemical, or register an agricultural or veterinary product, the NRA must be satisfied that the criteria specified in the Agvet Codes are met. The criteria specify that the NRA must be satisfied that the use is safe to humans, the environment, treated plants and animals and that the use will not adversely prejudice trade of treated produce. The NRA must by law remain satisfied that any product supplied in Australia meets the criteria set out in the legislation and registrants are required to bring to the NRA's attention any new information likely to adversely affect the registration status of the product. Through the Chemical Review Program the NRA also responds to concerns raised by users and the community at large, as well as to changing standards.

Changes to the status of a registered chemical product or approved label that are imposed by the NRA must be initiated through the review process as described in the legislation. In general reviews are initiated when new information becomes available or when problems are reported with a product suggesting current standards are not meeting current standards.

It is important to appreciate that the NRA cannot do anything that it is not empowered to do by either the *Agricultural and Veterinary Chemicals (Administration) Act 1992* or the Agvet Codes. Thus while the NRA is empowered by the Agvet Codes to register products once it is satisfied that they meet certain criteria specified in the Agvet Codes, it cannot deregister a product, or impose restricted uses on a product, unless the product has been subject to review and the product has failed to satisfy one or more of the legislative criteria. The NRA has to complete specific legal processes described in the Agvet Codes in reaching decisions, including appeal processes. As a result of the requirements of the program reviews can be lengthy.

If a product is under review because of some concern and a similar product is proposed for registration, the NRA cannot refuse or defer approval of that application until the outcome of the review is finalised. Rather, the NRA must treat the new application in the same way as similar registered products are treated, and apply the outcomes of the review to all affected products at the same time.

It is also important to appreciate that the NRA is not responsible for providing adequate chemical control, or providing replacement chemicals when products are lost from the market place, as a result of a review or for any other reason. If no registrant wants to provide a product for a particular purpose, the NRA has no role in resolving this problem.

In addition to the sheep ectoparasiticide review outlined above, the NRA recently completed a review of all approvals and products containing chlorfenvinphos, and is in the process of undertaking a similar review affecting approvals and products containing diazinon. Some common themes are becoming apparent as the NRA conducts these reviews, including a lack of commitment from registrants of 'old' products to generate additional data to support their continued approval.

The most "at risk" chemicals are the organophosphates, widely used in wool production as affordable lice control agents. Loss of the range of organophosphate chemicals available today could easily contribute to the development of resistance to other chemical classes, such as the insect growth regulators (IGRs). It is part of the NRA's responsibility to promote Australia's economic viability within the regulatory framework provided for by the legislation. However, this responsibility does not override the NRA's legislative criteria, which are specific and stringent.

The sheep ectoparasiticide challenge

In setting registration standards for sheep ectoparasiticides, the NRA needs to take into account safety to humans (both to users of the products and to people likely to come into contact with treated wool), safety to the environment, and the potential of residual pesticide to adversely prejudice trade in Australian raw wool. The animal welfare implications of lice and flies, as well as their impact on wool production, and the need for wool producers to have ready access to suitable control methods, including pesticides, also need to be considered.

The easiest approach for regulators is to define acceptable criteria for each of the key areas (public health, occupational health & safety, environment and trade) and then adopt these as the standards which products must meet, and stick rigidly to those standards. However there are a number of difficulties with this approach when dealing with sheep ectoparasiticides.

Some ectoparasiticides are used on only a small proportion of the national flock. The wool blending practices of commercial scouring plants will in most cases, dilute the residual pesticide that is present on only a small quantity of wool. Under those circumstances, it is unrealistic to derive standards on the assumption that all sheep are treated with the pesticide in question. On the other hand, current wool marketing practices are such that occasionally situations could arise where most of the wool passing through a scour at any one time could be contaminated with a particular pesticide. There have been examples of growers in a particular district following the same pesticide regime and selling their wool as a group to a particular processor.

When it comes to setting environmental standards, the requirements vary widely from location to location. For example, in Australia, standards based on the requirements for the most sensitive ocean discharge scenario are hardly relevant to land-based effluent disposal systems, which can generally tolerate higher residue levels.

Overseas, the residue levels required to meet environmental standards differ from processor to processor, depending on location and on-site effluent treatment facilities. Savage (1998) originally used a model based on the Spenborough scouring plant in the UK for setting environmental and trade criteria. Spenborough was chosen because it scoured mainly Australian wool and it was located in an environment thought to be representative of mills in Italy where significant quantities of Australian wool are scoured. However, environmental requirements at Spenborough (now closed) are quite different from those relating to the Calder River below Dewsbury, a relatively short distance away. Data for the Calder River below Dewsbury model is now available but may not be appropriate for the purposes of the sheep ectoparasiticide review, as the Calder River below Dewsbury may not be a good model for Italian scours.

If high residue wool could be identified and directed to a processor able to deal with it, the residue “problem” could be overcome by management rather than by regulation.

Importantly, if certain groups of pesticides (eg organophosphates and synthetic pyrethroids) are removed by the review process, sheep producers will be left with fewer groups of pesticides with which to combat resistance development. It is widely recognised that the best way to slow down the onset of resistance is to rotate different groups of pesticides. Another issue to consider is the animal welfare aspect of lice and fly control.

The challenge for regulators then is to take a pragmatic approach to pesticide regulation that takes all these factors into account, and that will allow producers to dip sheep or to treat flystrike as the need arises without compromising the need to be satisfied that human safety, environmental and trade concerns are met, as per the NRA’s legislation. To do this it needs the cooperation of all sectors of the industry.

The basis for cooperation

Human safety

There are two areas where the use of ectoparasiticides poses a threat to human safety – exposure hazards associated with the use of sheep dips, jetting products and mulesing/flystrike wound dressings; and the potential hazard residues on treated wool might pose to shearers and other wool handlers.

Hazards associated with pesticide application

Recent reports, such as the report of the Expert Panel on Organophosphate Sheep Dips (2000) suggest that work is needed in a number of areas to address the occupational hazards posed by the organophosphates. Initiatives sought by the NRA include improvements to container design, research into improvements to personal protective equipment, exposure measurement

data for hand jetting and dipping operators, increased education of users about the risks posed by organophosphates, and user awareness programs to ensure that users are aware of their responsibilities to minimise risks. Cooperation is needed from the veterinary chemical industry and peak wool industry bodies, as well as producers.

There are things wool producers can do to minimise exposure to hazardous substances such as OP sheep dips and mulesing/flystrike wound dressings. In addition to the requirement to follow label safety and use directions, OH&S legislation in most States now requires producers to comply with the requirements of the Hazardous Substances Regulatory Package when using pesticides. These requirements include the need to do a hazard assessment of the farm workplace, keep appropriate records of use, provide farm workers with appropriate information about the hazards of using the chemical and ensure they are adequately trained in their use, and where necessary to monitor the health of farm workers using the chemical.

With sheep ectoparasiticides, an important aspect of the farm hazard assessment would be to look closely at dipping and jetting facilities and practices, to see whether there are more effective ways of minimising exposure to the pesticide than relying solely on protective clothing. Examples include the use of splash guards, overhead walkways and safer work practices to minimise exposure through splashing, redesigning shower dips so that draining pens are well away from the topping up sump, redesigning automatic jetting races (AJRs) to reduce the amount of misting that occurs, and making sure that washing facilities and changes of clothing are available on-site in case workers are badly splashed.

Producers should also consider adjusting management practices so that the practicalities of carrying out management operations are taken into account. For example it is proposed that labels of diazinon products will in future carry a warning statement that use of the product should not be undertaken if it is too hot to wear protective equipment. A satisfactory alternative way of minimising exposure is needed to enable use of organophosphate products in circumstances where the wearing of protective clothing is impractical. Such a method could be the use of contract dipping operators using hydraulic dipping equipment able to lower and raise sheep in a cage without splashing the operator.

Widespread adoption of such “best practice” pesticide management could help to minimise the risk of OP exposure and allow the NRA to take a more pragmatic approach to the regulation of such pesticides.

Hazards associated with chemical residues on wool

Excessively high residues of organophosphates and synthetic pyrethroids on wool have potential to cause human health problems to shearers and other wool handlers. Although fairly rare, residue concentrations as high as 598 mg diazinon/kg wool have been detected in individual clips (Savage, 1998) and these are high enough to pose a health risk to shearers handling such wool. Such residue concentrations could only be caused by misuse, eg by applying the product within a few weeks of shearing, or by applying a number of repeat applications over the growing season which would indicate that other management problems need to be addressed.

As reported in Savage (1998) use of synthetic pyrethroid backline products in long wool can result in residue levels on the tip of backline staples high enough to cause dermal erythema in shearers and other wool handlers. Such residues arise from use at recommended levels and is an issue being examined by the NRA review of sheep ectoparasiticides.

Clearly wool producers have a responsibility to make sure they use products strictly according to label and to minimise use, particularly of the organophosphates and synthetic pyrethroids, close to shearing. Again, such a “best practice” approach to pesticide use may help to minimise the need for regulatory intervention.

Environmental and trade issues

Trade issues mainly relate to environmental ones, in that the Australian wool industry is very concerned that wool processors in other countries, may in the near future reject Australian raw wool if residue levels are high enough to cause environmental problems when discharged in scouring effluent

Savage (1998) examined the residue levels necessary to meet anticipated environmental requirements in the UK and Europe and concluded that had those requirements been in place at the time, about 90% of scouring lots would have failed to meet anticipated requirements for organophosphates and synthetic pyrethroids. He concluded that withholding periods of six months would have been necessary for organophosphates and 11 months for synthetic pyrethroids in order to ensure wool met anticipated overseas requirements.

Savage and Russell (1999) also noted that about 40% of wool produced in Australia would meet anticipated requirements. The problem is that under existing marketing arrangements, it is very difficult to identify such wool. Yet in reality identifying the residue status of treated wool is relatively easy, with the recent development of a relatively cheap testing method (Russell, 2000).

The widespread use of wool testing for residues offers a realistic way for the wool industry to manage the residue problem rather than having it managed for them by regulation. As noted by Savage (1998) and Russell (2000), different wool processing plants both in Australia and overseas have differing abilities to handle high residue wool, either as a result of differing environmental requirements or on-site effluent treatment ability or both. If individual processors were to establish the level of residue contamination they would cope with (a relatively easy task) and source wool according to their residue handling capability (to do so they would need to know the residue content of the wool on offer), then the role of the regulator could be less deterministic in this case.

The answer may rest in the ability of the wool industry to identify treated wool and ensure that it is scoured in an appropriate facility. However, this requires the cooperation of all sectors of the industry. Growers would need to identify treated wool and its residue status to buyers. Buyers would need to know the requirements of the processors they are buying for and source wool accordingly. Brokers and exporters would need to be able to meet their information needs. Processors would need to be able to determine their residue capability and communicate this information to the market.

In fact this is likely to happen in the not too distant future. As a result of the IPPC, wool processors, like all other processing industries in the UK, are required to report discharges of pesticides to the environment and this information is made publicly available. Savage and Russell (1999) are of the view that this, together with the provisions of the IPPC, is likely to force processors to adopt “best practice” by improving the efficiency of their processing plant, upgrading their on-site effluent treatment facilities and sourcing low residue wool.

Australian wool producers can take advantage of this by implementing “best practice” use of pesticides aimed at minimising residues, as well as identifying treated wool to intending buyers, either by vendor declaration as proposed by Savage (1998) or by having wool tested as proposed by Russell (2000).

Such a systematic adoption of “best practice” by all sectors of the industry would enable the NRA to:

- (a) Determine for each product and approved use pattern, an occupational health and safety “rehandling period” that must elapse before treated sheep are shorn, and which will take precedence over all other standards.

- (b) Also establish a “critical environmental residue limit” for harvested wool that is based on Australian environmental requirements at Black Rock ocean outlet, after taking into account the percentage of the national flock likely to be treated, and determine the withholding period necessary to meet that standard (to be referred to possibly as the “wool harvesting interval”).
- (c) Where the proposed use is considered essential for animal welfare reasons, and it is possible to scour the wool in certain scouring facilities without posing an environmental threat, consider approving use of the product within the wool harvesting interval, providing the following conditions are met:
 - (i) any shearing rehandling period must be observed;
 - (ii) treated sheep and wool must be suitably identified to intending buyers; and
 - (iii) mechanisms must be in place to identify and deal with treated sheep and wool, and to educate wool producers, buyers and processors about their obligations.

Obviously where the shearing rehandling period is longer, use of the product within the wool harvesting interval would not be possible.

Savage (1998) proposed that the wool harvesting withholding period be shown on the product label in the form of an advisory statement along the following lines:

“Wool harvesting interval

Use of this product may result in residue levels in harvested wool that are unacceptable to Australian and overseas processors. It is recommended that wool not be harvested for at least ‘x’ months after treatment. Longer withholding periods may be necessary for wool intended for certain overseas markets. If sheep are treated within this period, treated sheep and wool must be identified to intending buyers by vendor declaration. For further information, including information on overseas trade requirements, contact 1800 phone number”.

If this approach were to be taken, it would be essential that the wool industry, in consultation with the NRA and State departments responsible for primary industry, develop suitable mechanisms for identifying and handling wool (eg. by requiring a vendor declaration or analytical certificate at sale), and implement mechanisms to ensure that treated wool is appropriately processed. The wool industry would also need to develop mechanisms for providing growers, buyers and exporters with information on the residue needs of importing countries.

Challenges for the wool industry

As Savage and Russell (1999) noted, the Savage (1998) report poses a number of challenges for the wool industry. Those challenges are to recognise that the residues issue can’t be ignored, that it is an industry-wide problem that all sectors of the industry have to deal with, that it is manageable, and that an industry driven solution is preferable to bureaucratic intervention.

About 60% of Australian greasy wool is processed offshore and a significant proportion (about 35%) goes to the UK and European markets. Certainly EU processors are acutely aware of the potential effects of proposed EU environmental standards that will be adopted by member countries in October 1999 and fully implemented by October 2007. “Best practice” will progressively become a requirement for processors, and this is expected to force UK and European processors to demand low-residue raw wool. The long lead-time between treatment and scouring (usually at least 18 months) also needs to be kept in mind.

There are several options for managing the problem - minimising residues in wool at the farm gate, minimising residues in effluent discharged from scouring plants by installing on-site

effluent treatment plants, scouring more wool on-shore, and identifying pesticide treated wool so that buyers and exporters can make an informed choice.

It is probably in the latter area that most potential exists. The Woolmark Company residue survey data indicate that there is sufficient low residue wool presently available to meet European market requirements, even without changing current practices. The key is to identify the residue status of the wool at the time of sale, so that buyers can make an informed choice. High or low residue wool could be “streamed” to appropriate markets and processors. Suitable market incentives for low residue wool and disincentives for high residue wool, backed up with Fair Trading legislation, would provide growers with strong market signals and encourage responsible use of chemicals. A complementary approach is to incorporate chemical residues into industry quality management systems, and to develop vertically integrated systems where “best practice” growers deal with “best practice” processors.

There are two options for identifying the residue status of wool at the time of sale - chemical testing or vendor declaration, again backed up by Fair Trading legislation. Vendor declarations have been made to work in the cattle industry where the consequences of making an incorrect declaration are severe. In the wool industry, traceability is much more difficult once wool sales lots are blended into a processing lot, and this is an issue the industry may need to address.

CSIRO Wool Technology has developed an analytical technique that promises to substantially reduce the cost of testing to make it more widely adopted as a pre-sale test. This test methodology has now been recognised by IWTO.

The wool industry as a whole is now moving into a critical phase. It is imperative that the residue status of the Australian wool clip continues to be monitored and that the industry develops a comprehensive understanding of the needs of overseas markets. Wool producers will progressively be expected to respond to changing market needs as these needs become apparent.

Equally critically, producers need to improve management practices in line with community health and safety expectations, and changing environmental standards. Where particular uses of chemicals are seen as critical for the future viability of the wool industry, adequate measures must be implemented to enable these uses to remain.

While it appears that pragmatic solutions to these problems could be developed, the NRA must continue to be satisfied that products registered for use on sheep are suitable for this purpose. There is no room for complacency.

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