



Supporting the  
land-based industries  
for over a century



## Project Information Note

Date: 3<sup>rd</sup> May, 2006

For further information, contact Lisa Webb, Advisory Officer, RSPB Scotland

### CONSERVATION CONSIDERATIONS REGARDING THE USE OF AVERMECTIN ANIMAL HEALTH PRODUCTS

LISA WEBB, South and West Scotland Advisory Officer, RSPB Scotland

DAVY McCracken, Senior Agricultural Ecologist, SAC

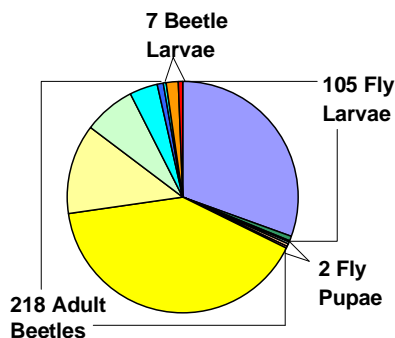
DAVE BEAUMONT, Senior Reserves Ecologist, RSPB Scotland

RUEDI NAGER, Senior Lecturer, University of Glasgow

This *Project Information Note* provides an overview of the findings from recently completed PhD research funded by RSPB Scotland and SAC and conducted jointly between SAC, University of Glasgow and RSPB.

#### LIVESTOCK DUNG - A VALUABLE RESOURCE FOR FARMLAND WILDLIFE

Livestock dung supports a diverse community of invertebrates, as is illustrated by this figure which shows the number of individuals and range of species within a small sample (approximately 100 cm<sup>3</sup>) taken from a 2 month old cow pat in the middle of winter.



Although a number of species of dung insect are of conservation interest in their own right, in general the larger species (such as *Aphodius* dung beetle adults and larvae and yellow dung fly adults and larvae) are more widely known as being important food for a range of farmland birds and mammals.

Many of these (such as rooks, chough, starlings, lapwings, wagtails, badgers, hedgehogs and shrews) obtain the insects by foraging directly within individual dung pats while others (such as swallows, martins and bats) take the insects in the air while flying over fields containing the dung from grazing livestock.



Livestock dung can hold large numbers of insects, such as these adult *Aphodius fimetarius* dung beetles.  
Dmitry Telnov

---

## THE EFFECTS OF AVERMECTINS ON INSECTS IN LIVESTOCK DUNG

Avermectins is the collective name given to the active ingredients in a range of animal health products used to control internal worms and other parasites affecting farm livestock. After an animal has been treated with an avermectin, residues of the chemical are excreted from the animal in its dung. The highest residue concentrations occur in dung that is excreted in the first days after treatment, while smaller residue levels can be present in dung excreted up to several weeks after treatment.

The avermectin residues retain their insecticidal properties in the livestock dung. It is well-documented that exposure to these residues can

adversely affect dung insects colonising individual dung pats (through either killing the adult insects or their larvae or impairing the adult insects ability to reproduce). This markedly reduces the number and type of insects available to birds and mammals foraging within affected dung pats. Little was previously known about whether these effects at the level of the individual dung pat had any impact on the overall dung insect populations occurring at the field scale. This PhD research put a particular emphasis on investigating these latter aspects, given concerns that any reduction in levels of dung insects in fields might limit the availability of insect food for aerial foraging birds and bats.

---

## THE EFFECTS OF AVERMECTINS ON FIELD POPULATIONS OF DUNG INSECTS

This research focused on the abundance and diversity of dung insects occurring within fields in Ayrshire grazed either by untreated cattle or cattle treated with doramectin (the active ingredient in the products being used by the farmers on the study sites). Although differences in adult dung beetle and yellow dung fly populations were evident both between different fields and within individual fields over time, the results indicated that these differences and fluctuations in abundance and diversity were mainly due to weather and season. There was no evidence to indicate that numbers of dung insects are significantly reduced in fields grazed with doramectin-treated livestock.

However, higher rates of physical abnormalities were observed in adult yellow dung flies occurring in the fields grazed by treated cattle. This may reflect exposure to doramectin residues when those flies were larvae developing in dung in those fields. Additional experiments showed that several species of dung beetle avoided colonising dung from doramectin-treated cattle when dung from untreated cattle was available. It is unclear whether this was because beetles were repelled by the residues or whether other factors reduced the attractiveness of the treated dung. This does, however, suggest that it may be possible to reduce beetle exposure to residues by ensuring that untreated dung is also available to colonise.



Barn swallows collect dung-associated insects for their young when flying over fields grazed by livestock. RSPB Images

---

## CONSERVATION MANAGEMENT RECOMMENDATIONS

Dung insect populations are dependent upon dung being available to colonise. Hence, wherever there is a conservation interest in dung insect populations (or in the birds and mammals which forage on such insects), the first concern must be to ensure that dung from grazing livestock continues to be available at the times of year most appropriate to the species involved. This may therefore mean accepting the need to use livestock which have been treated with avermectin products as part of a parasite control strategy.

- Where the conservation focus is particularly on aerial foragers (such as swallows, martins or bats) then the results of this research suggest that there should be little concern over the livestock being treated with avermectin products (even if residues are present within individual dung pats in individual fields during the key dung insect foraging periods for these aerial foraging species) provided that there is sufficient additional avermectin-free dung available in and/or around the fields being grazed by treated animals.
- Where the conservation focus is particularly on species foraging within individual dung pats (such as lapwing, redshank and chough), then there is still concern that a reduction in the insect resource within individual dung pats could increase the time these species need to spend foraging for food during key chick growth periods. Ensuring that avermectin-free dung is also available to forage within may potentially limit any adverse impacts on foraging vertebrates. Further research is, however, needed to investigate this fully.

Irrespective of the specific conservation concerns, the overall objective should be to maximise the amount of avermectin-free dung which is available in and/or around a field at any one point in time during the spring and summer. The ways this could be achieved will depend on the individual situation, but could involve, for example, one or more of the following:

- treating livestock only when necessary and avoiding treating older animals if they are not susceptible to the parasite of concern;
- grazing avermectin treated livestock in fields close to others containing untreated animals;
- treating livestock with an appropriate non-avermectin product or moxidectin (a less toxic avermectin);
- altering (if relevant from an animal health perspective) the timing of avermectin treatment in the spring (to change the period when residues in the pats coincide with key foraging periods of the vertebrates);
- restricting the use of products containing doramectin, ivermectin or eprinomectin to housing of the livestock or in the autumn (when the main dung insect breeding season is over).

Veterinary advice should, however, always be sought when designing or seeking to change a livestock parasite control regime.



Dung from grazing livestock is essential for dung-associated insects and the birds and mammals which feed on these. Maintaining grazing regimes may involve accepting the need for a livestock parasite control strategy.  
RSPB Images.