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Practical implementation of holistic internal parasite management in sheep[☆]

G.F. Bath

*Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria,
Private Bag X04, Onderstepoort 0110, South Africa*

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Abstract

In spite of the availability of a range of worm control strategies in sheep to counter anthelmintic resistance (AR), implementation remains poor. The reasons include farmer perceptions of the relative importance of internal parasites, a preference for quick and easy solutions, an unwillingness to pay for advice rather than treatment, and a tendency to switch (change) drugs or use combinations. Parasitologists may give advice based largely on worm control not related to economic or practical realities and do not always convey a clear, unambiguous message. Advisors are frequently not well-informed enough to give holistic advice and may be biased because they also sell drugs. Pharmaceutical firms expect high volume turnover of their products and thereby encourage overuse and misuse. Fierce competition and the availability of generics have made drugs cheaper, and therefore, a seemingly good option. Combination drugs and long-acting drugs tend to cover up AR and shorten the useful life of a drug group. Drug registration and testing requirements have to be reviewed. A synopsis of possible solutions to these problems is given together with practical guidelines on how veterinary advisors should go about getting the holistic management of internal parasites of sheep implemented at the farm level.

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1. Background

Parasitic infestations are considered to be the biggest veterinary problem in sheep worldwide; internal worms are recognized as by far the most significant part of this sector of diseases (Waller, 1997, 1999).

Much attention has, therefore, been focused on this aspect and over the past 10–15 years there has been a radical revision of previous worm control strategies and assumptions, largely due to the ever-accelerating global failure of anthelmintics (Rose, 1970; Martin et al., 1981; Van Wyk and Malan, 1988; Besier, 1997; Van Wyk et al., 1997, 1999; Waller, 1997; Van Wyk, 2001, 2003). This has caused a dramatic change in many of the “accepted wisdoms” that have governed expert advice to farmers for close to a century (Besier, 1997; Waller, 1999; Bath et al., 2001; Van Wyk and

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E-mail address: gareth.bath@up.ac.za.

Bath, 2002; Besier and Love, 2003; Van Wyk, 2003). For a start, we have had to abandon the underlying philosophy that internal parasites are an evil plague that should be maximally suppressed, or preferably totally eradicated. We have had to learn to farm with the presence of parasites, trying to prevent only the unacceptable production losses while simultaneously breeding animals fit for the environment, rather than making the environment fit for the existing animals. By regarding parasites as part of the natural order of things, we will come to regard them simply as one of the many potential problems to be managed in order to achieve optimum productivity and profitability. And yet, in spite of early warnings of escalating anthelmintic resistance (AR) and the availability of many alternatives and supplementary measures to lessen the overdependence on anthelmintic drugs (Van Wyk and Malan, 1988; Bath et al., 1996, 2001; Van Wyk et al., 1997, 1999; Waller, 1997, 1999; Bath and Van Wyk, 2001; Malan et al., 2001; Van Wyk and Bath, 2002), the reality is that many (and probably most) farmers continue to base their worm control strategy on drugs (Van Wyk, 2003). The question is, why? Unless we can answer this question, we cannot expect to know how to change the situation.

While this paper applies to helminths, and mainly nematodes, the parallels that can be made and inferences that can be drawn for ectoparasites, and even other organisms, should be obvious.

2. Factors working against implementation

There are many reasons why farmers do not accept or implement much of the currently advocated holistic and sustainable advice on internal parasite control. What follows is a brief synopsis of these factors.

- From the farmer's perspective, the following are most pertinent: worms are usually not uppermost in the farmer's mind, and other priorities usually take precedence since they are seen to be more urgent or important. In many situations this is perfectly true. Furthermore, for similar reasons, farmers like simple and quick solutions even though these may be unsustainable in the longer term. This largely comes down to the fact that controlling worms by management is more complicated than a standard

treatment programme (McKellar, 1994; Soll, 1997) and therefore, a "treat and forget" approach seems to be preferable for most farmers. Yet worm control is inherently complicated because various worm species are affected in different ways by factors like farm management and weather, and therefore demands different approaches for efficacy (Waller, 1999; Van Wyk, 2001). It is also clear that farmers are generally more willing to pay for drugs than for advice. This is a problem of perceived value and is the inevitable result of valuable advice being given away free for decades in many countries. Advice not paid for is often advice ignored. Finally, farmers will often not appreciate the problem of anthelmintic resistance until it is very advanced (Van Wyk et al., 1999; Van Wyk, 2001). This is partly because AR usually only becomes evident once efficacy drops below 50% and partly because farmers simply switch to another group or use combination drugs when problems emerge until eventually no effective drugs remain.

- Advisors and parasitologists cannot escape some blame for the reluctant implementation of holistic worm management. First of all, there are too few well-informed veterinary advisors giving unbiased advice which is sustainable in the long-term (Van Wyk, 2003). Perhaps more important, because most of the researchers who develop worm control systems are expert parasitologists who tend to be worm-centred, and not sheep production or farmer profitability oriented in their thinking, their advice is not necessarily dovetailed with pasture management or other requirements and procedures on farms, but is added on independently. Unfortunately, unrealistic advice by parasitologists may be based on perfect worm control and not on the economics or practicalities of the situation. In addition, it is a general observation that researchers often make poor communicators to the intended beneficiary, the practical commercial farmer. The practical message may become confused or disguised by scientific argument. Equally important, if on-farm veterinary advisors are also selling the drugs, there is a potential clash of interests. This can occur particularly when private veterinarians fill both roles, as there will be a temptation to sell drugs on financial grounds and not primarily for the benefit of farmers.

- Pharmaceutical companies and distributors must also accept a share of the blame. The major drug companies have huge advertising budgets and field forces and can therefore exert a significant influence on farmer thinking and behaviour when it comes to parasite control. This can apply to the thinking and advice of veterinarians in the field as well. The driving force in these firms is sales volume, usually related to projected targets and budgets. Therefore, they continue to advocate and encourage reliance on drugs, blanket treatments and excessive treatments which are certainly good for short-term profits but are not sustainable in the long-term. Sales staff have little choice but to sell, even if this is against their better judgement.

Although most farmers would heatedly deny it, drugs are actually too cheap, partly due to fierce competition but mainly due to the availability of so many generic products. This has forced drug prices down. Corrected for inflation, the cost of drugs has actually dropped over the years (Van Wyk et al., 1999). Using drugs is therefore reckoned to be a cheap option (Van Wyk et al., 1997).

Combination drugs are often advocated to deal with the AR problem. By using this “fruit salad” approach, the development of AR can be disguised until all drugs fail (Van Wyk, 2001). Nevertheless, this option is favoured by many firms in order to extend the life of their products. Similarly, long-acting drugs are much in vogue and easy to use but are potentially dangerous because of their tendency to create AR (Besier and Love, 2003). In spite of this drawback, they continue to be developed and recommended for widespread use even though this may shorten the useful life of the anthelmintic group as a whole.

The excessive requirements for the registration of new drugs is also having a negative influence since pharmaceutical firms are reluctant or unable to meet the astronomical costs involved, which they can hardly recoup in the period of patent protection.

The use of standard, fully susceptible worm strains which are maintained under laboratory conditions for the testing of new drugs or formulations must be scrutinised since these strains may not give a true picture of drug performance on farms.

Acceptance of the equivalence of products that are supposed to be identical (generics) must also be

challenged. Products may apparently be identical in formulation of structure, but efficacy may be very different.

Overall, it must be accepted that paradigm shifts are difficult to achieve since basic thinking has to change, and this takes time, effort and determination. The inertia of the system works against this happening and it is easier to stick to old trusted recipes than change to new ones.

3. Realistic solutions available

All the above factors have to be taken into account when developing strategies for changing farmer perceptions and practices. It is of little or no value to hope that farmers will somehow change their methods without firm and consistent leadership from veterinary advisors and parasitologists. Therefore, the following proposals do not involve farmers as initiators, and place the onus and responsibility for the changes needed squarely on the shoulders of those who are best placed to take the lead. This group includes parasitologists, veterinary advisors and the pharmaceutical industry.

The veterinary advisors and parasitologists are the groups that have to take on the primary role. The advisors in particular, with their regular contact with farmers and the position of trust they have earned, have to make a sustained effort to make farmers aware of the need for change by giving frequent warnings of the dangers inherent in a drug-dominated worm control strategy and by encouraging them to adopt an incremental approach of holistic internal parasite management. This initiative must involve greater numbers of trusted advisors, including private practitioners in particular, but also animal health technicians or others who may be able to fulfil this role well. This greater involvement requires that members of this group must be well-informed and highly competent; therefore, appropriate and sustained continuing education is essential. Advisors should come to regard this service as a good generator of income, but for this to happen advice must be made a saleable commodity that is seen to be worth a lot more than the drugs that would otherwise be used. This can only happen if the advisors are financially skilled and are able to show that the cost of the advice that is given is lower than the alternative of excessive or unnecessary treatment.

Parasitologists need to establish and then emphasize the relative economic importance of different worm species in each area, and not allow themselves to be distracted by minor issues or their pet projects and research interests. They should certainly continue to research practical alternatives to chemical control as experience has shown that nothing is static and the worms too will adapt to changed circumstances. The advice that is given must be simplified and practical, and parasitologists will have to avoid the temptation to be precisely correct at the expense of implementability and acceptance by farmers. Therefore, only the vital issues should be emphasized, because overelaboration blurs focus and sows confusion and doubt. The advice given should be fully integrated with other priorities and realities and not stand-alone or contradict economic imperatives.

The new paradigm needs to be accepted by a combined and sustained effort on a worldwide scale if possible. We should try to standardise the message we wish to convey both within countries and internationally to increase its impact and credibility. To be really effective, the message needs to be simplified and repeated. Just as pharmaceutical firms conduct their advertising and marketing campaigns, advisors have to accept the necessity of amplifying the essentials and giving the same message consistently via all the media at our disposal. We need a concerted international propaganda effort to break the current mould.

In the longer term, computer power must be harnessed for analysis and advice, because the factors affecting decisions are so complex that it is almost impossible to consider them all simultaneously and in proper relationships with each other (Besier, 1997; Van Wyk, 2003). However, computers are unlikely to replace the persuasive power of individual contact and personal trust completely. Computer information and guidance is in any case only as good as what is put into the programme and is not infallible.

The pharmaceutical industry must also accept its responsibilities beyond short-term profit. Pharmaceutical firms need to acknowledge that it is in their interest to advocate sustainable anthelmintic use to prolong the useful life of their products. These companies should continue to look for new molecules or formulations, but if these are found, they must be properly used to prolong their useful life. Unfortunately, this will go against current commercial practice.

Drug testing legislation also needs to be revised. The drug registration system, which discourages any new registrations because of enormous costs and unrealistic requirements, is ultimately counterproductive and militates against the interests of the supposed beneficiary, the commercial farmer. This spiral of ever-increasing and more stringent registration requirements cannot be allowed to continue, and needs drastic revision. Testing of drugs should be done not only against "tame" laboratory worms, but rather on existing field strains. The efficacy of generics also needs stricter evaluation before acceptance of them as equivalent to other products.

4. Practical implementation on farms

It is advisable to use a checklist to make sure all actions and principles are rationally and completely covered at each consultation. It is vital at the outset to get farmers to acknowledge the multiple problems that confront them, and to accept that therefore more complex solutions are required. In this way, they can be led to see both the short-term and the long-term benefits of holistic worm management.

When farmers are faced with contradictory advice, it helps to ask them to identify the source of the advice. If advisors also benefit from drug sales, the question must be asked whether bias and financial interest may be skewing the advice offered, irrespective of whether this bias is intentional or not. A good advisor always puts the client's interests above his or her own.

Implementation should always start with the basic programme of grazing and flock management on the farm, as this is the foundation of the farm system. This implies that advisors must know about the grazing programme in use and its effects on worm control, and have a working knowledge of the grazing paddocks or areas, their sizes, when they are used, the types of grazing, the rotations used and the grazing pressure, as these factors all influence parasite epidemiology. In the evaluation of a grazing plan, the effects of other grazing species that may be present, must be considered and they should be used as "vacuum cleaners" of the pasture for worm control where possible. Worm "hot spots" must be identified and reduced, particularly near water leaks, moist spots, pens and marshes in drier climates where infective larvae may reach high levels.

Establish the essentials of the reproductive programme, since risk groups can then be identified and management can be adapted to cater for these groups specifically. Concentrate on breeding ewes and lambs/hoggets as the high-risk categories. It may be necessary to minimize unacceptable or overwhelming risks by changing the lambing date or season if the situation demands it.

Drugs must be used to best advantage using established principles, like drug selection according to the faecal egg count reduction test (FECRT), starvation before treatment, drenching over the tongue, using a double treatment, or an increased dosage or even combinations as may be appropriate (Waller, 1997, 1999). However, we should not try to do without drugs completely except in very dry areas. When drugs are to be used, it is essential to use the best drug for the situation, not necessarily the cheapest or broadest spectrum or longest acting.

Advisors should advocate the use of regular faecal egg counts (FECs) which for economical reasons should be pooled (10–20 animals of a given type or flock), conducted at a useful frequency (every 1–2 months), and properly interpreted by a competent person. The worm situation should be monitored and advisors should react accordingly. Selective treatment using the FAMACHA[®] system, body condition score (BCS) or average daily gain (ADG) should become the norm (Vatta et al., 1999, 2000; Bath et al., 2001; Van Wyk and Bath, 2002).

Whenever possible, try to eliminate the “treat all and move immediately” strategy—either treat only some animals (preferably just those needing it, or a random fraction of the flock), or move all treated sheep only 2–3 weeks after treatment (or at the end of the residual action period) to a “safe” pasture (Van Wyk, 2001). This will ensure that selection for AR is minimized.

Concentrate on the major worm problems. This implies that the biggest parasite problems are known and their epidemiology taken into account. Cull the non-coping ewes (those needing the most treatment over a season) and their offspring from the breeding programme whenever this is feasible (Bath et al., 2001; Bisset et al., 2001; Van Wyk and Bath, 2002). This will usually be less than 5–10% of the group. Use only rams that are tested for improved resistance or resilience (Albers et al., 1987; Bisset et al., 1994, 2001; Bisset and Morris, 1996).

Quarantine all animal introductions immediately on arrival and treat as thoroughly as possible to prevent or limit the introduction of highly resistant worm populations (Van Wyk, 2001). Thereafter, place the animals on infected pasture to ensure genetic dilution of those worms that survive the treatment.

Advisors should keep a watch on current initiatives which are under development, like strategic feeding of proteins, the use of nematophagous fungi, feeding of condensed tannins, vaccines and copper oxide wire particles (Waller, 1999; Bath et al., 2001). These could reach a stage where practical implementation becomes possible.

Finally, advisors have to accept the things that cannot be changed in a given situation, and rather concentrate on the things that can be changed. They have to be flexible, and react to changed conditions as they arise.

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