Parasite Control Programmes for Elk/Wapiti

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The following is an accumulation of research and practical experiences combining research, hearsay, sensible ideas and good results and should be considered in light of your own experiences and practicalities.

History and Review

It has been recognised now for some time that one of the keys to improving elk/wapiti performance under New Zealand deer farming conditions is to develop an effective parasite control programme, particularly in young animals. When red deer and elk are grazed together it is critical to treat the red deer at the same time as elk to reduce pasture contamination and minimise larval challenge on the elk.

Problems also exist in older animals especially elk/wapiti bulls under nutritional and seasonal stress.

Wapiti/hybrid/red differences in susceptibility to parasites

Studies on different strains of farmed deer in the early 1990's by Ken Waldrup and Colin Mackintosh (assisted by donations of animals from individuals in the EWSNZ) showed considerable differences in susceptibility to both lungworm and gastrointestina parasites (Waldrup et al 1994). This may be because elk have evolved in the North American environment where the experience of long harsh winters, different graze/browse diet and naturally low stocking densities create low parasite risk.

Some of the species of stomach worms present in Europe are absent in North America with elk never evolving any genetic resistance to them. Elk were the most seriously affected by a condition loss and poor health. "Fading Elk Syndrome" appears largely due to abomasal parasitism, particularly Ostertagia types. These parasites have a juvenile stage that lives in the wall of the fourth stomach (abomasum). As the larval invade the wall damage results allowing less acid secretion by the stomach lining resulting in protein loss and poor digestion. Diagnosis is almost impossible in the living animal as the immature worms are not producing eggs. Treatment was compounded by variable results of oral drenches. Changed rumen conditions created by inflammation of the rumen wall and changed secretions altered the efficacy of then available drench by altering pH.

1. White Drenches

Benzimidoles and "new" generation "white drenches" appear to be variable in control and effect. The effect is greater in elk which appear to be more susceptible to abomasal parasites than red deer. However, if the burdens are severe the high (lowered) pH results in poorer drench performance.

An albendazole trial assessing red deer, (hybrids F1 elk x red) and elk/wapiti weaners demonstrated poor efficacy against lungworm in all 3 subspecies. Reasons given suggest that there was poor killing of immature or migrating lungworm larvae allowing substantial numbers maturing into adults. This was particularly so in elk/wapiti and the recommendation was made that albendazole had a particularly poor efficacy or performance in weaner elk.

Factors like the level of peak and duration of plasma concentrations of albendazole sulphoxide, (which are lower and shorter in deer and cattle than in sheep) reduce the effectiveness particularly against lungworm. The mere presence of parasites in the abomasum also effects negatively on the uptake and pharmakokinetics of this class of drench. The work suggests that albendazole is metabolised much more quickly in elk than F1s or red deer and again reduces control. Note also that the white drenches have no long term activity (<48 hours) and therefore must be used at 21 day intervals to prevent larval shedding in faeces.

You could also speculate that with imported elk/wapiti genes and in upgrading programmes there may not be the same genetic adaptation to the parasites commonly associated with red deer and cattle in New Zealand conditions. This may become more critical with advancing elk genes. This possibility, combined with evidence of increased susceptibility and differences in drench efficacy in elk/wapiti underline the critical importance of establishing a routine and effective parasite control programme.

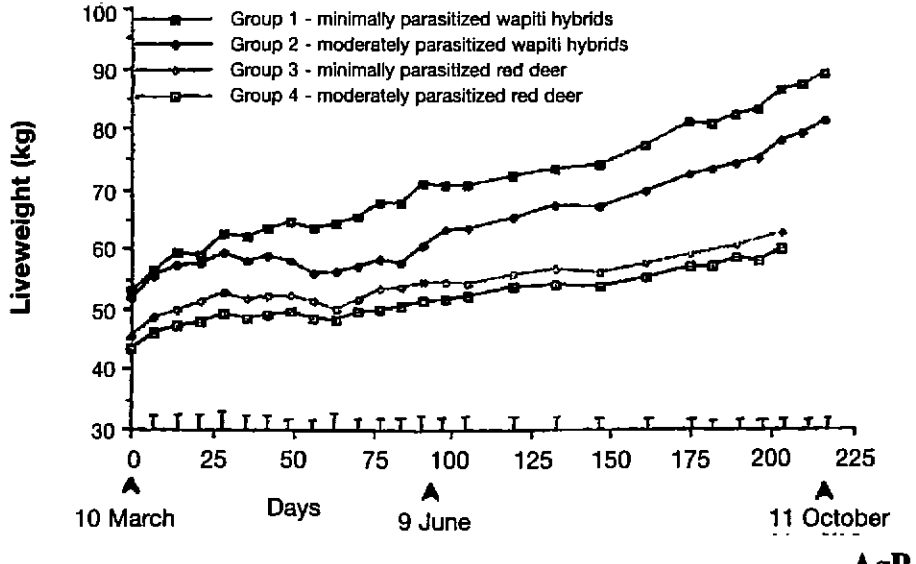
Conclusions

Because of variable efficacy, short duration of activity and availability of more effective anthelmentics white drenches cannot be recommended for routine use in elk/wapiti or elk/wapiti hybrids.

2. Growth rate studies and Ivermectins - Red and Wapiti hybrids

In studies designed to compare the effects of parasitism on red and F1 (elk x red) hybrid weaners from autumn to early spring, results demonstrated clearly that stringent parasite control in wapiti hybrids gave very significant increases in liveweight gains from 49 days post weaning until slaughter at trials end. Optimal parasite control was achieved by pour on application of Ivermectin at high three times the cattle dose levels (1500 ?g/kg LWT) at 21 day intervals. Deer that were maintained as moderately parasitised and treated (i.e. long term but controlled lungworm and abomasal parasites without risk of mortality) were established by treating with the white drench group (Albezol DC @ 10 mg/kg LWT) at 35 days rather than the standard 21 interval for white drenches (Fig 1).

Figure 1 Liveweight changes in red deer hinds and wapiti hybrids and wapiti hybrid on different anthelmintic programs from weaning to 10 months of age



In red deer the two treatments (35 vs 21 day white drench) gave a slight but not significant weight gain difference (Table 1).

The decision to use Ivomec Pour-on at three times the recommended cattle liveweight dose came from earlier work that indicated the response at the normal dose rate was not as effective in elk/wapiti especially against Ostertagia type larvae. The normal dose lowered the adult ostertagia population but did not lower the abomasal larval populations as effectively as the higher dose rate. No additional problems of increased dose were evident.

This again links with other work and reports of the "fading" in mature wapiti. "Fading" or in some cases "vanishing" syndrome is associated with abomasal parasitism with particular reference to inhibited or immature larvae in the stomach lining. Waldrup suggests there is a different parasite mechanism involved in young wapiti type animals. Control required a new approach.

Conclusions

* Ivermectins at 2-3 times the cattle dose rate substantially reduced the lungworm infection, although it did not eliminate them completely.

* Liveweight advantages of Ivomec treated hinds remained significant until slaughter at seven months after weaning.

* "Standard" treated deer (21 day white drench) had a similar weight gain in the last three months, but not over the critical post-weaning autumn and early winter periods.

* Neither albendazole, or ivermectin is completely effective at removing immature lungworms or abomasal worms.

* Parasitism has a greater effect on liveweight gains in wapiti hybrid weaners than in red deer weaners for three months post weaning.

Implications for elk/wapiti or parasitism control

Increasingly farmers are refocusing on management for late lactation pre and post weaning and autumn growth rates. The autumn period is the most opportune time for parasite control programmes, and evidence suggests substantial advantages can be made with the correct treatment and timings. When this is combined with management changes over late lactation and autumn that focus on maximising growth, substantial advantages in weaner growth can be made. The question then is what products and when to use.

Critical Times For Elk/Wapiti	
Calves	Autumn, winter, spring
Cows	Late spring/summer prior to calving
	Autumn pre mating
	Early winter post rut
Bulls	Late autumn - early winter (post rut)
	Spring - velvet growth

3. Effectiveness - Moxidectin drenches

In 4-5 month old red deer, Middleberg (1994) showed that the moxidectin formulation was particularly effective against: lungworm, (99.5%), Haemonchus, Ostertagia, Trichostrongylus and Oesophagostomum ssp, (>99.9%), when correctly applied as a pour on, at the recommended dose rate of 1 ml per 10 kg LWT (0.5 mg/kg).

This supports previous work (Mackintosh et al 1993) that moxidectin pour on (Cydectin and the identical product Vetdectin) at the recommended dose is highly effective (100%) at cleaning lungworm in young red weaners, as was injectable Ivermectin at the recommended and double dose rates.

Moxidectin Pour-on achieved 100% clearance of abomasal worms with Ivermectin injection 99% effective at 200 (g/kg (normal) and 100% at double dose (400 (g/kg).

Both drenches are effective against immature worms (early L4 larvae) at both dose rates. For abomasal larvae (L4) Ivermectin injection achieved 84% efficacy at the normal dose and 96% efficacy at the double dose rates. Moxidectin was 99% effective in removing L4 larvae at the normal dose. Later work, by Waldrup 1994 confirmed the high efficacy of 0.5% moxidectin in wapiti and hybrids.

Persistence

For an effective drench programme the question of persistence is important in determining the drench interval.

In trial work under natural and experimental challenge control animals (untreated) began to shed larvae detectable in faeces at around 21 - 28 days from challenge.

Ivermectin Pour-on treated deer had negative faecal larval counts until 49 days and moxidectin Pour-on until 63 days after treatment. As lungworm have a pre patent period of 24/25 days the suggestion is that the persistent activity against reinfection "first runs out" after 24-25 days from treatment with ivermectin pour-on, and after 38 - 39 days with moxidectin pour-on.

By 45 - 46 days after ivermectin treatment 100% of deer appear to be infected while 50% of moxidectin deer are unaffected 52 - 53 days after treatment. No endpoint (100% infected was studied in this trial) for moxidectin. Under field conditions it is recommended to use Ivomec Pour-on at four week intervals and Vetdectin/Cydectin at six week intervals.

Overall conclusions

These studies indicate that for elk/wapiti weaners particularly, but generally for red and hybrid weaners, moxidectin pour on at the recommended dose rate, applied accurately and properly is the most effective parasite control treatment because of high efficacy and for the length of its persistent activity.

Summary: Trial Results (from Waldrup 1997)

Albendazole

i) Oral drench (licenced for use in deer)
- Effective in red deer dose rate 10 mg/kg
- This dose rate is not effective in wapiti.

ii) Sustained release bolus (not licenced for use in deer)
*• no faecal larval shedding of lungworm for 14 - 112 days for red weaners, >>growth rate LWG for 90 days but >>nos inhibited ostertagia type larvae in abomasum build up over this period.

"Morantal" (not licenced for use, not readily available in New Zealand)

i). Wapiti - sustained release intra-ruminal bolus
- reduced death rate and parasite associated ill thrift in 2 yo stags over autumn and winter.

Ivermectin

Dose Rate		Species	Effectiveness	
Oral	(std) 200 µg/kg	red deer	100%	effective lungworm (LW)
Injection	(std) 200 µg/kg	red deer	100%	effective lungworm
			99%	effective adult abomasal worms (AAW)
			84%	Abomasal L4 larvae (AL)
	(2x) 400 µg/kg	red deer	100%	effective LW
			100%	AAW
			95%	AL
Pour-on	(3x) 1500 µg/kg	red deer x	100%	LW
		wapiti	100%	AAW
		hybrid	51%	AL

Moxidectin

Dose Rate		Species	Effectiveness	
Pour-on	(std) 500 µg/kg	red deer	100%	LW
			100%	AAW
			99%	AL
	(std) 500 µg/kg	red deer x	99.75%	LW
		wapiti	100%	AAW
		hybrids	99%	AL

4. Later Generation Drenches "Eprinex", Genesis, etc

There appears to be little or no specific published work with deer and especially wapiti/elk type animals. These new generation products address the issue of persistence and residues in the body by being somewhat shorter term in peak activity and longevity as an effective parasite controller. "Eprinex" pour-on is licenced for use in deer.

"Genesis" is currently not a licenced deer remedy.

Manufacturers claims for use in deer should be understood and recommendations followed. If these compounds are your drench of choice it reinforces the need to have the timing of treatment and dosage correct to be most effective.

Practical Stuff - The Invermay Programme - *An example for discussion*

We are now routinely yarding hinds/calves from early January (admittedly with great care and some nervousness) for growth rate studies over lactation. Some faecal larval counts from this period and in early February strongly suggest a significant worm burden exists under normal summer conditions from an earlier age than previously expected.

Hinds and calves respond well to this type of handling and in effect training. We have now moved our drench programme forward to late January using a moxidectin pour-on carefully related to calf weight at least 4 weeks prior to weaning in late February.

Hinds are all treated with moxidectin approximately 2 weeks prior to calving start and we try and incorporate some graze safe practices as hinds are mobbed up after calving and begin their controlled rotational grazing pattern around regrowth silage paddocks, new grass or topped and control summer pasture. We don't use sheep or cattle as topping worm "vacuum cleaners" as a practice, because of the increased risk of MCF and JohnÈs Disease. Pasture control is either by mechanical or large mobs of stags for grazing control.

At this time permanent tagging, vaccinations and drenching are done while the calves are with their mothers in an effort to reduce stress and not add to the separation stress of weaning with a whole lot of other interventions.

The February period has also been an excellent time to introduce barley or oats to the group. We believe there is considerable advantage in mother/calf education to new concentrated feeds, a certain cost effective weight gain boost .

Finally, the close daily contact eases the weaning stress producing a settled and growing group in early March for as long a period as possible before winter.

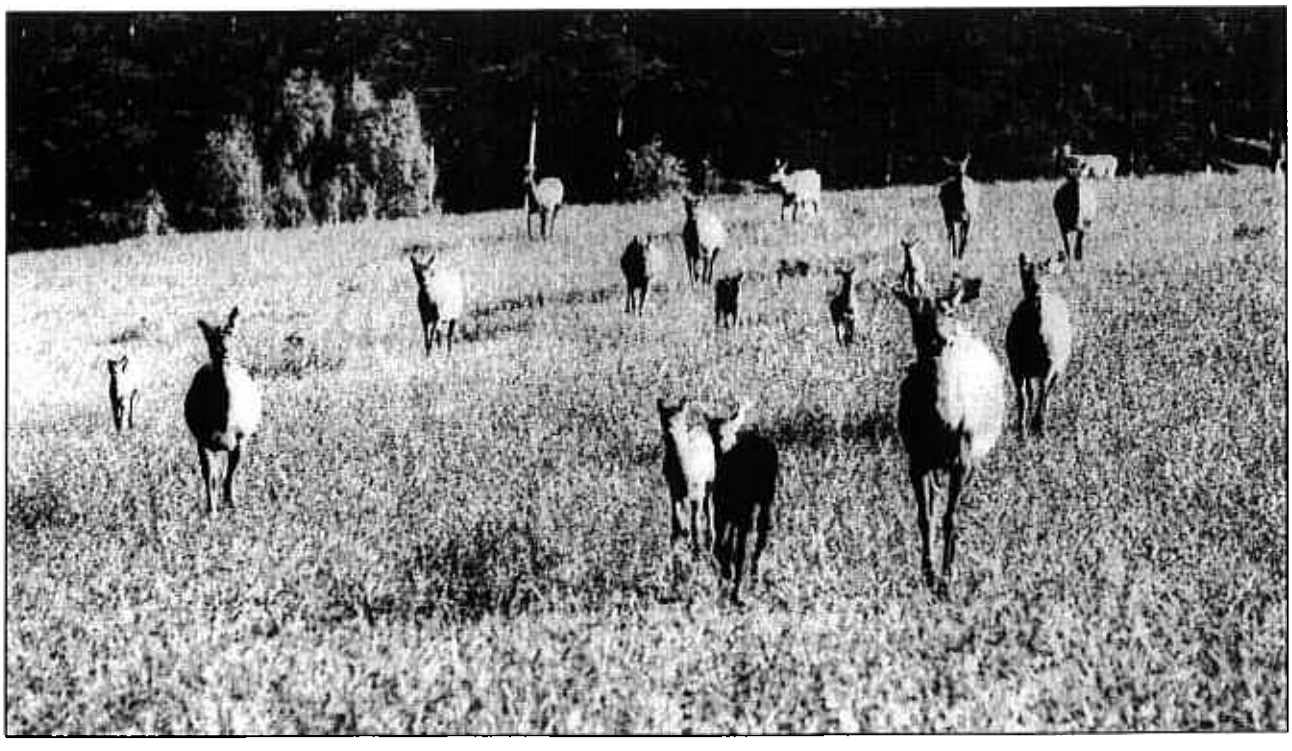


Photo courtesy of Brian Kenton, Leander Downs.

The drench programme follows: **Red deer and F1 elk wapiti and wapiti elk.**

1) **calves/weaners** (Red deer rates)	40 kg late Jan/Feb	Pour on moxidectin.
	50 kg late Feb (4 weeks)	Pour on moxidectin Selenium Pour-on or oral
	→ weaning late Feb	Yersiniavax (injection 1)
	56 kg late March/April (35 days)	Pour on moxidectin, copper Copper bullets (4g)
	62 kg mid/late May + 35 days	Pour-on moxidectin Selenium Pour-on or oral
	72 kg late August/early September	Pour on moxidectin plus Selenium Copper (1x4g for our conditions)
	January - replacement females	Pour-on moxidectin, Booster vaccination (5 in 1)

Adult hinds	Pre-mating	Pour-on moxidectin Selenium
	Pre-calving	Pour-on or oral moxidectin Selenium Vitamin B12 Copper Yearlings vaccination boost (5 in 1)

2 yo and older stags	Tb testing mid-winter	Pour-on moxidectin
	Velveting - removal	Copper, moxidectin, selenium

This programme works well for us in a highly stocked intensive environment, is very effective from the view point of parasite control but may be over the top in relation to frequency in autumn and a perceived need. Faecal larval monitoring is carried out as a routine check.

All drench labels state that some rotation of drench families on an annual basis should be considered and the effectiveness of the family of choice should be checked periodically. In addition all state that accuracy of dose and well maintained and correctly functioning equipment is vital. To date we have not followed a drench rotation practice without any ill effect.

Practical approaches and questions

1. **What drench to use?**

"Should I alternate "white" and "clear" drenches.

Best option on current information

Moxidectin

- Cydectin, or its equivalent Vetdectin. Pour on
- Standard dose rates/per kg LWT.

Ivermectins

- It pays to double or triple the dose rate for working effectiveness.

Alternating drenches

There appears to be no trialled or anecdotal evidence of ivermectin or moxidectin resistance to parasites in deer. A variance of drench type as is commonly advised in sheep and cattle practice is not likely to be as important in parasite control as developing a well timed and accurate dose rate programme in weaners.

2. **Oral vs Pour ons vs Injectables - Is there a difference**

The main object is to administer the dose at the required liveweight recommendations. With the advent of Pour-on Selenium and Selenium prills and Deposal (Selenium bullets) the need to oral dose to include selenium has changed. If the lack of hard physical contact with your weaners is important - for ease of operation pour-ons have a real advantage. Uptake via absorption is excellent and the modern product is rain safe (within limits)

However, it pays to consider applying pour-on as a last action before animals leave the shed or ensure that ventilation is very good for your own and the weaner comfort if animals are held. There have been reported problems (death loss) when weaners were treated, loaded in a trailer and carted only small distances.

Speed shouldn't be the priority - correct application along the spine in a line, rather than the blob on the small of the back, is recommended most effective approach at skin rather than hair level. For that reason we apply the product from tail to shoulder rather than the manufacturers recommended application.

Our experience has been that injectables can have a stinging reaction approximately 15 - 20 seconds after dosing. In older animals this can produce a "payback" reaction. As a policy we believe the less needles involved in animal health programmes the better.

3. **What programme? When to start and timing**

- Mid - late lactation, at least 3 weeks prior to weaning. Autumn is the most critical period.
- Animals under stress in winter can be susceptible to parasite burdens.
- A spring clean out after wintering, then natural immunity should develop needing pre-mating and pre-calving control programmes.

Table 2: Comparative Drench Costs

Weaner Programme (based on suggested retail cost)			
1. Cydectin Pour on			
Moxidectin 5l	$690	Dose: 1 ml per 10 kg 21 days withholding period	13.8¢ per ml
2. Ivomec injectable			
Ivermectin 500 ml	$315	Dose: 1 ml per 50 kg (cattle) 2-3 ml per 50 kg (recommended wapiti for effective control) 28 days withholding period	63¢ per ml
3. Ivomec Eprinex pour on			
eprinomectin 5 ml	$690	Dose: 1 ml per 10 kg 14 days withholding	$13.8¢ per ml
4. Systemex oral			
Oxfendazole 20l	$190	Dose: 1 ml per 5 kg 10 days withholding	95¢ per ml
(also advised as 2 doses 48 hours apart for heavy infestation)			
5. Cydectin Oral (sheep)			
moxidectin 20l	$482.50	Dose: 1 ml per 5 kg 10 days withholding	2.4¢ per ml
6. Valbazen (sheep)			
albendazole 20l	$233	Dose 1 ml per 5 kg	1.16¢ ml

	Invermay	Retail costs		
Product	**Total dose over weaner programme Autumn/spring**	**Red**	**Hybrid**	**Wapiti/elk**
Cydectin	Pour on (36-42 day interval)	$3.87 28 ml	$4.29 32 ml	$4.96 36 ml
Ivomec	standard dose	$4.69 28 ml	$5.24	$6.16
Eprinex	double dose recommended (28 day interval)	$10.48 64 ml	$12.32 72 ml	
Ivomec injectable	standard dose 28 day interval double dose recommended	$3.65 5.8 ml	$4.53 7.2 ml $9.06	$5.42 8.6 ml $10.84
Cydectin Oral	35 day interval	$1.54 64 ml	$1.87 78 ml	$2.11 88 ml
Valbazen	21 day interval	0.91 78 ml	$1.09 94 ml	$1.26 108 ml

Clearly cost differences are estimates only under one programme and don't take account of the differences in handling and administration, animal response or relative effectiveness.

What appears to be the cheapest option may not be the most effective, nor the most effective the most expensive. Personal experience, veterinary advice and the critical use of product at the correct dose, at the correct time are the most important factors.

How long has it been since you really read the label? and have good and working knowledge of:

* dose rate,
* useable conditions and limitations,
* effective compounds,
* withholding periods,
* storage conditions - light/dark, etc,
* use by date,
* manufacturers recommendations,
* licensing for use,
* health and people safety issues

There is another whole story right there.

References/Further Reading

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