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Future University of Agriculture & Natural Resources

Anthelmintic effects of a diet containing a traditional plant *Viscum verrucosum* on faecal egg count and eosinophils of naturally infected Tswana goats

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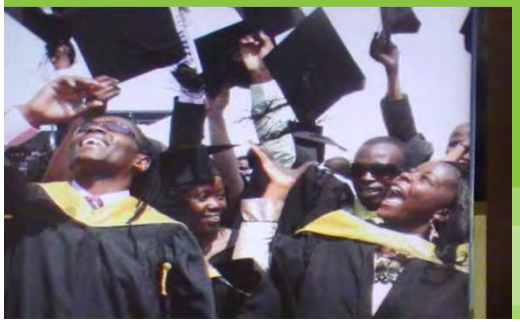


Small ruminants

- Small stock offers opportunity to contribute to poverty eradication, empower youth and women
- Generate wealth and diversify the animal agriculture
- Tswana goats has high frequency of twinning (1.7 kids/doe; Madibela *et al.,* 2002)
- Combined with high fertility (90%) & short gestation
- Means more meat can be realised in a relatively short period

Internal parasites

- However, constrain to improved production is nematode parasites
- Warm temperature & soil moisture during rainy season, promote large number of infective larvae when kids/lambs are born
- No functioning immunity for young ones
- Compounded by relaxation of immunity by ewes/does three week before and after birth (peri-parturient period)
- Resulting in high worm burdens & high excretion of eggs
- Thus contaminating pasture and infecting young ones
- Resulting in diarrhoea
- Protein leakage into gut >> need to synthesise more protein to replace wasted one

Consequences for small stock

Nutritional penalty due to establishment of immunity

Cytokines & pro-inflammatory cytokines

↓

Depressed feed intake

↓

Skeletal & protein catabolism

↓

Efflux of amino acids to fuel immune system

↓

Reduced growth

- **Control of parasites heavily reliant on anthelmintic drugs**
- **Resource-limited farmers do not afford these drugs**
- **Not effective due to low quality, infrequent use**
- **The use of anthelmintics encourage drug resistance**
- **A need to shift strategy of parasite control**
- **Proposed biological control which include use of condensed tannins-containing forages**
- **Demonstrated that plants with CT reduce FEC (Butter *et al* 2000; Kabasa *et al* 2000, Osoro *et al*., 2007).**

Viscum verrucosum

- Mistletoe that attach itself on branches of Acacia species, Boscia albitrunca, Ziziphus mucronata and other trees
- Leafless but has long vines
- More abundant on Acacia species
- Propagated through seeds by birds
- Has 164g/kg CP, 16.2g/kg Ca, 1.5g/kg P and 75g/kg condensed tannins, 57% DM digestibility, 66% effective DM degradability (Madibela et al 2002; Madibela et al 2003; Madibela et al 2004)

Materials and Methods

V. verrucosum

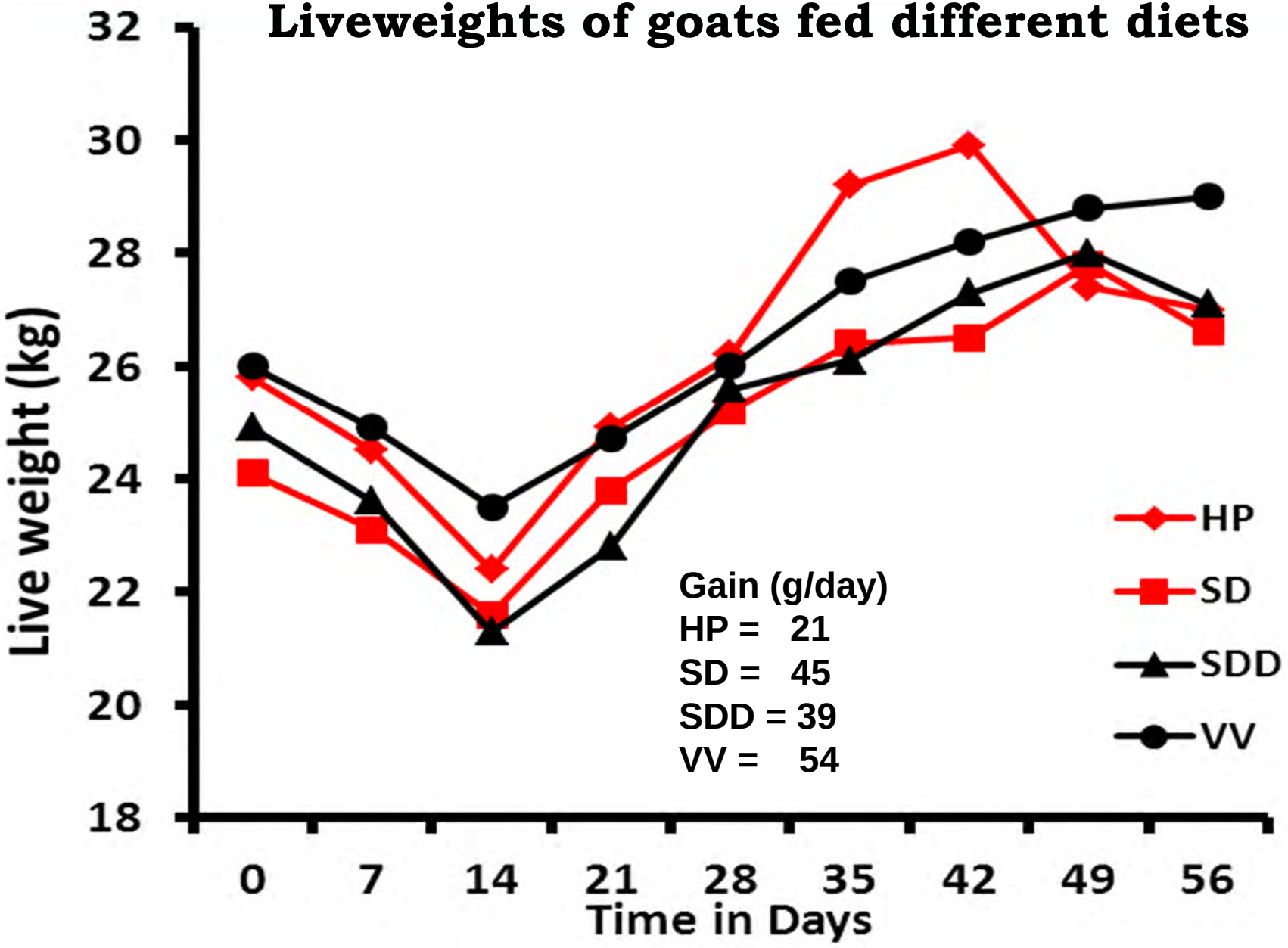
Collection of Faeces

Capturing live weights

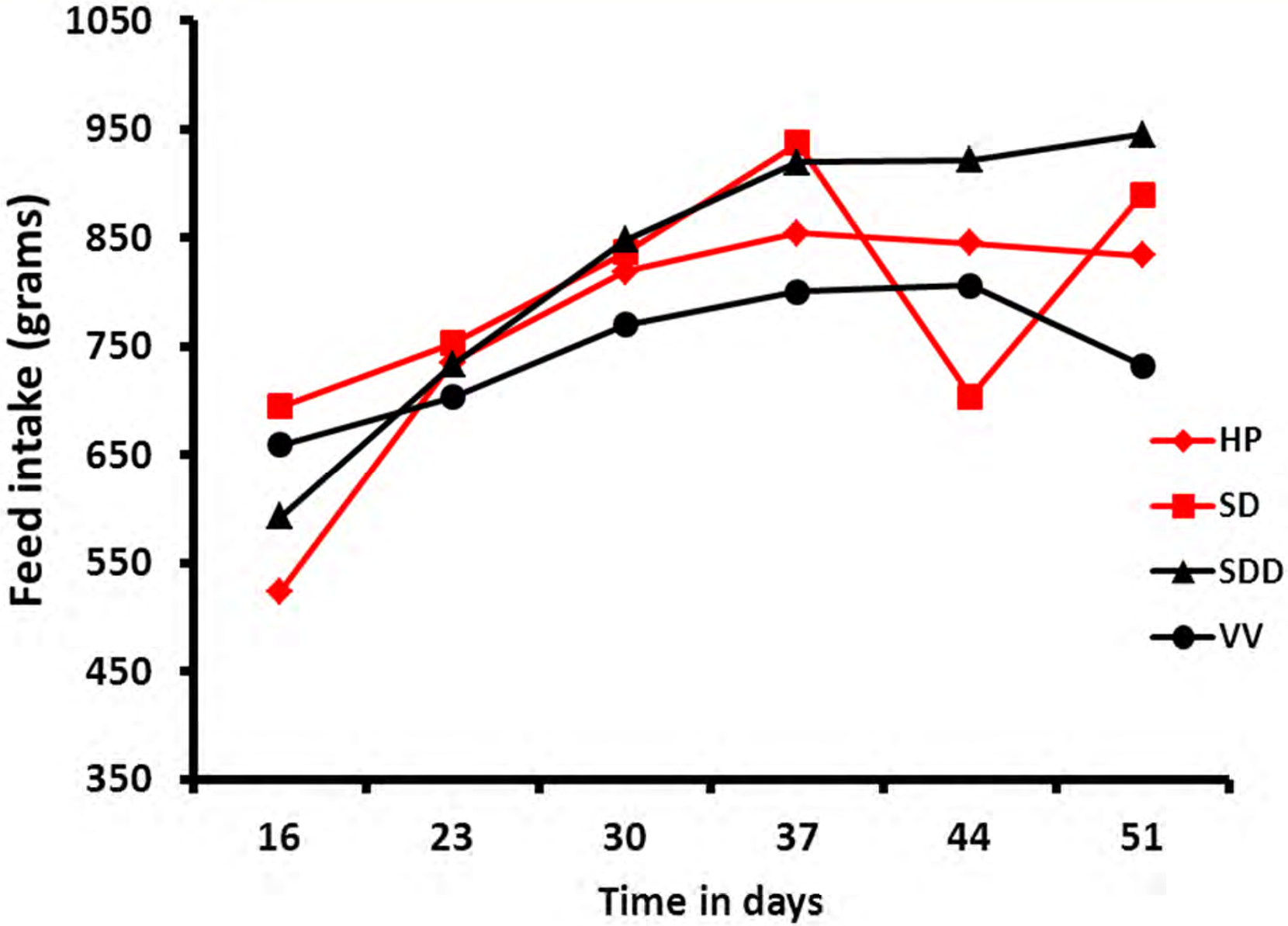
Processing of Faecal matter in Lab

Ingredient	Standard diet	High Protein	V. verrucosum
Maize grain	20	20	27
Grass hay	60	60	20
Soyabean meal	10	10	4
V. verrucosum	0	0	40
Molasses	9.0	9.0	9
Urea	0.8	2	0
Salt	0.3	0.3	0.3
DCP	0.3	0.3	0.3
Estimated CP (g/kg)	123	157	121

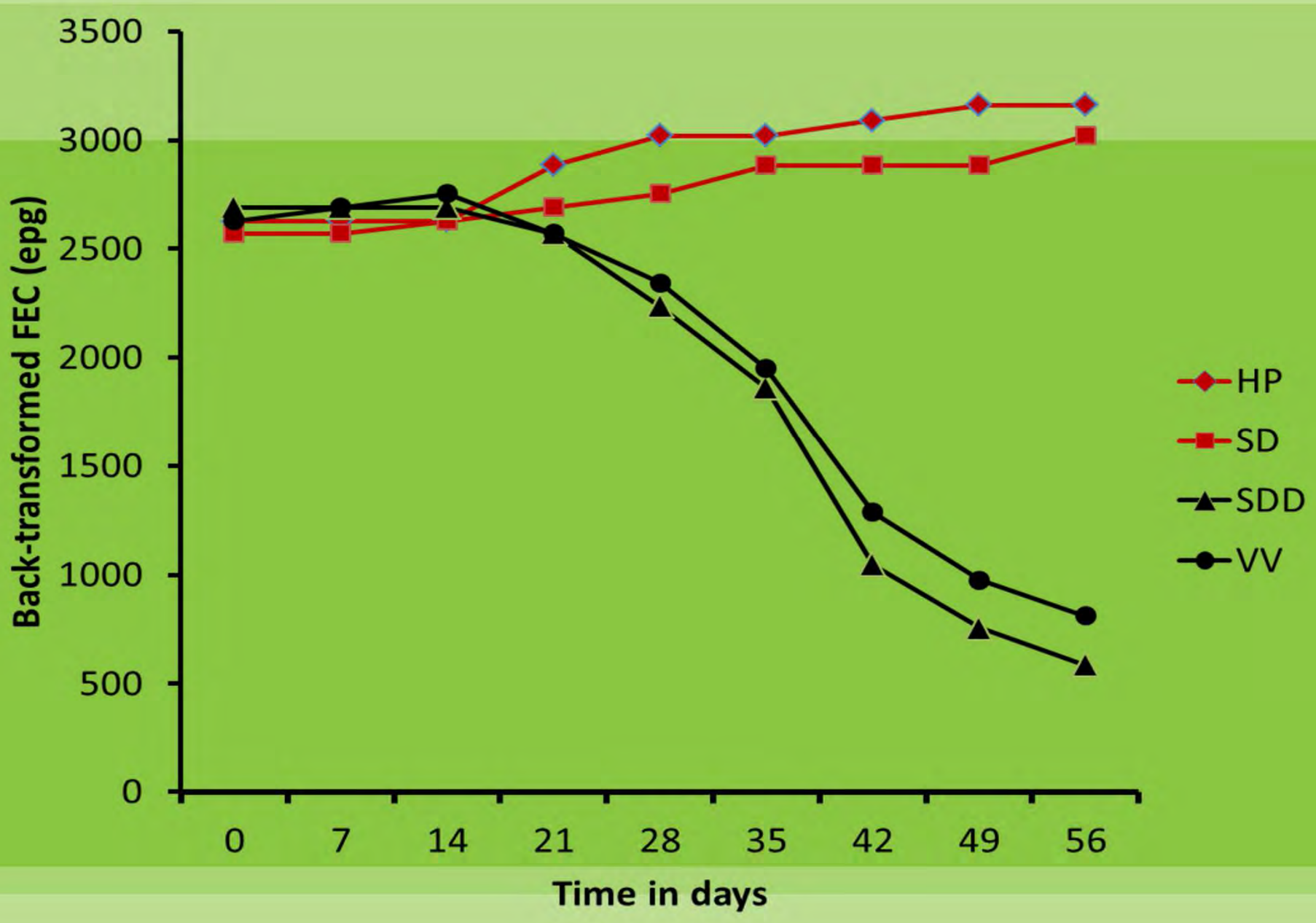
Results & Discussion



Feed intake of goats fed different diets



Mean faecal egg count of goats fed different diets



Some of the blood parameters

	HCT[1]				HGB				Eosinophil			
Trt/Time	0	21	35	49	0	21	35	49	0	21	35	49
HP	42	36	36	34	14	12	12	11	10	10	10	9
SD	42	41	35	36	15	14	11	13	8	8	9	8
SDD	40	36	33	35	14	12	11	12	9	7	4	0.8
VV	40	39	31	31	14	14	11	10	9	7	3	1.4
SL[2]	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	***	***

[1]HCT = Hematocrit; HGB = Haemoglobin

[2]NS = not signifigant; * = P<0.05; *** = P<0.001

- **Interestingly eosinophils were lower day 35 and 49 after treatment in animals feed VV or dose with Valbazen**
- **Previous school of thought was that eosinophils were first line of defense against in-coming larvae & would be expected to be high in blood (Valderrábano and Uriarte 2003)**
- **Recent data (Gebreselassie *et al.*, 2011) report that eosinophils actually preserve nematode larvae**
- **This would benefit host by preserving antigens stimulus for Th2 response that prevents future re-infection**
- **Or the response of eosinophils in the present study may be a sign of activated immune function which has not yet accomplished eliminating parasites in HP and SD animals**

Conclusions

- No difference in Feed Intake
- No difference is live weight though VV fed goats gained more
- Viscum verrucosum diet was as effective as Valbazen in reducing FEC
- Eosinophils were lower in blood of VV-fed and dosed goats
- Indigenous flora provide opportunities to counteract drug resistance by parasites

Policy Statement

- Need to test other neglected plants for efficacy in control of nematode parasites
- Conserve both indigenous knowledge and plants for sustainable control of internal worms and increased livestock productivity [Agro-forestry]
- Use of natural flora in control of internal parasites is a novel way of fighting parasites resistance to drugs
- Small holder farmers would benefit from less expensive use of indigenous plants to control nematode parasites
- Collaboration –Veterinarians & Chemists
- Research funding made available

Thank you

1. **Desmond Tutu Education Trust for the funds**
2. **The herdmen who looked after the animals**
3. **Technicians at parasitology laboratory are thanked for assistance**