The effect of supplementing sweet potato vines on goat intake, growth parameters and gastro-intestinal nematode infestation

By

Luthuli CF, FN Fon* Kunene NK

[1]Agriculture, University of Zululand, KwaDlangezwa, 3886, South Africa.
Presenting Author* Email: FonF@unizulu.ac.za

Talk overview

1. Introduction
2. Objective
3. Experiments
4. Findings
5. Conclusion
6. Application

Introduction

- **Livestock ~ 34 % the total protein in human diets (FAO, 2018)**
- **Demand for meat -protein source increases yearly**
- **Especially in Africa = plant protein sources scarce**
- **Income, over 500 million poor, many from rural areas are dependence (FAO, 2018)**

Introduction…

- **World's human population is about 7.7 billion (Wordometers, 2019)**
- **World's Growth rate = 1.02%/yr = 82m**
- **Africa contributing ~ 15% = 1.02 billion**
- **Africa growth rate = 2.2 %/yr = 22.5 million**
- **Europe growth rate = 0.3%/yr = 2.7 million**

Introduction…

	Continent	Population	% contribution	Net change (P)	Yearly (%
1	Asia	4,584,807,072	59.4	39,673,978	0.87
2	Africa	1,320,038,716	17.1	32,118,198	2.49
3	Europe	743,102,600	9.6	454,590	0.06
4	Latin America and the Caribbean	658,305,557	8.5	6,293,556	0.97
5	Northern America	366,496,802	4.8	2,652,312	0.73
6	Oceania	41,826,176	0.5	564,964	1.37

https://www.worldometers.info/world-population/

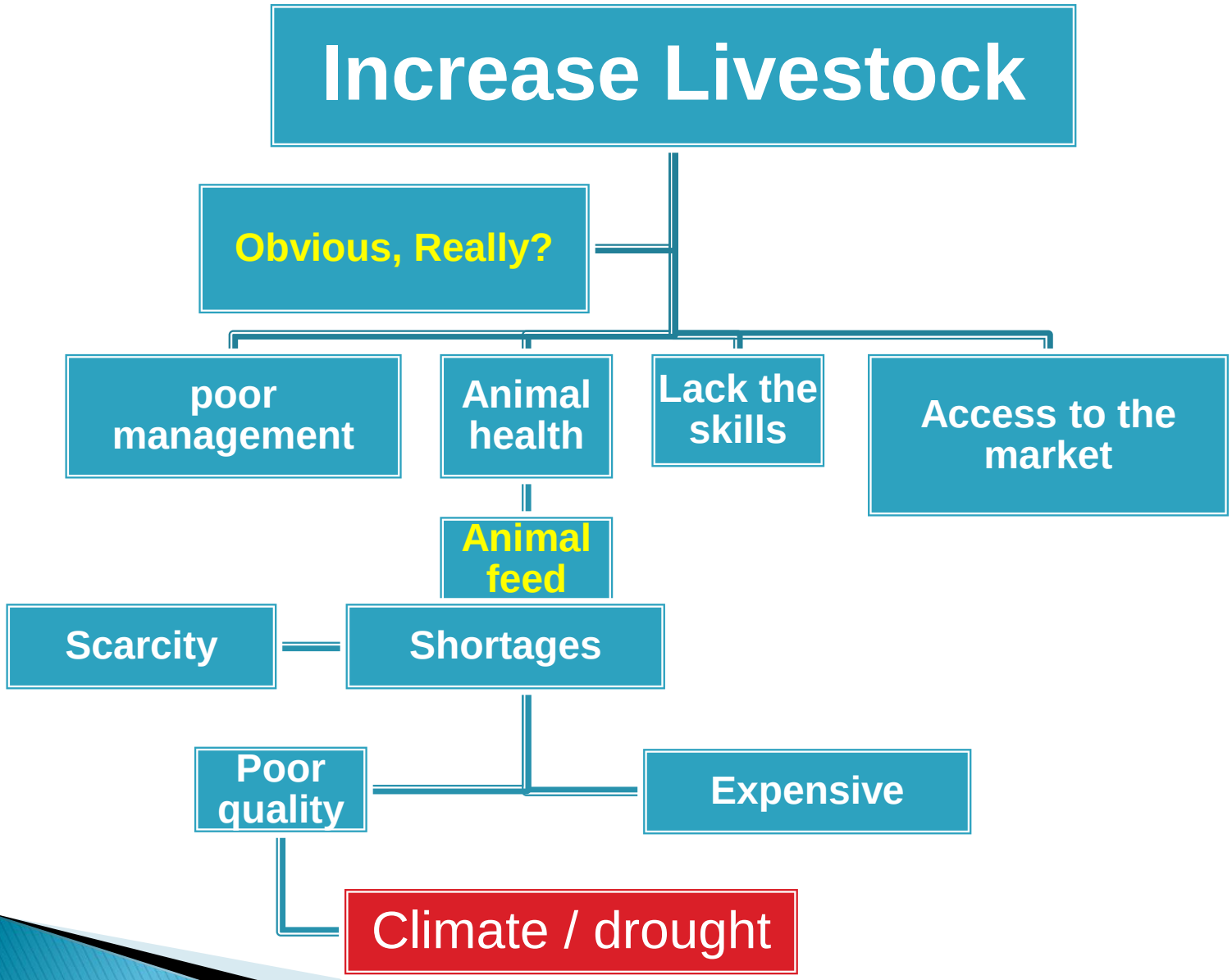
Introduction …

Need to increase livestock production ?

Yes

How?

Introduction…



Introduction…

- **86 % of Livestock rely primarily on forages, crop residues and by-products that are not edible to humans**
- **Only 13 % depends on potential feed ingredients edible by human**
- **Should the 13% be**  **or** 
- **Health-wise? Anthelminthic resistance ???**
- **Goats and sheep**
- **Need for alternative sources ??? Plant base?**

Introduction

- **Small holder farmers – highest small ruminants population Africa**
- **Alternative feeds**
- **Crop residues**
- **Sweet potatoes vines – many rural farmers**
- **Zululand community**
- **Draught tolerant - crops**
- **Burnt, mulch or allow to rot**

Anthelminthic Resistance…

- Helminths (worm) – Major problem
- **Chemotherapy**–Benzimidazoles, ivermectin, albendazole, levamisole,
- **Resistance and residue left**
- **Plant Anthelmintics**
- Blind test – Extracts Unknown (Phenolics)
- Known extracts – Atanine, Santonin, Phenantherenes, Eugenol, (tannin)
- **Advantages** – Diversity/reduce residues/cheaper

Problem statement

- **Protein demand from livestock is high**
- **Low forage availability during winter (nutrition & moisture content).**
- **Drought hit in the past years /water scarcity South Africa**
- **Helminths resistance from anthelmintic drugs.**
- **Alternative anthelmintic and residues requires alternatives e.g. Plant based products.**

Specific objectives

- To evaluate the effect of supplementing goats' diet with sweet potatoes vines on thier performance and nematode infestation.

- **Hypothesis**

- Hypothesized that supplementing goats' diet with sweet potatoes vines will not increase goats performance or decrease nematode infestation

Study area

- OSCA
  - Located under Umhlathuze District Municipality, in KwaZulu-Natal South Africa.
  - Laboratory work = University of Zululand lab
  - found at 28°45’S Latitude and 31°53’E Longitude
  - Rainfall of about **900mm** per annum and 26°C mean temperature per annum (Kunene, 2015).
  - Cultivar of SP planted = N 90

Materials and methods

Chemical Analysis:

- Sweet potatoes vines (SPV)
- SPV samples = oven dried at 60^{o}C and milled to 1mm size particles.
- NDF, ADF and ADL were determined following van Soest (2003) method.
- Crude protein (nitrogen x 6.25) in forage were determined using micro-Kjeldahl method.
- Tannins were determined using acid-butanol according to Makkar (1995)

Materials and methods

Chemical Analysis:

- SPV samples = oven dried at 60^{o}C and milled to 1mm size particles.
- NDF, ADF and ADL were determined following van Soest (2003) method.
- Crude protein (nitrogen x 6.25) in forage were determined using micro-Kjeldahl method.
- Tannins were determined using acid-butanol according to Makkar (1995)

Materials and methods

Animals, treatments and experimental design

- Goats (32) = 4 feeding level and 8 replicates
- Randomised complete block design with 4 treatments
- Each goats allocated to individual pen (150 x 50 x 100cm).
- Controlled environment = fed hay adlib and some SPV supplemented
- 10 days adaption period prior actual experiment and data was collected for 8 weeks.

Methods…

This experiment involves four forages treatments:

Treatments	**Sweet potatoes vines (SPV) (kg)**	***Eragrostis* hay**
T0	0	ad libitum
T1	1,5	ad libitum
T2	2	ad libitum
T3	3	ad libitum

Methods…

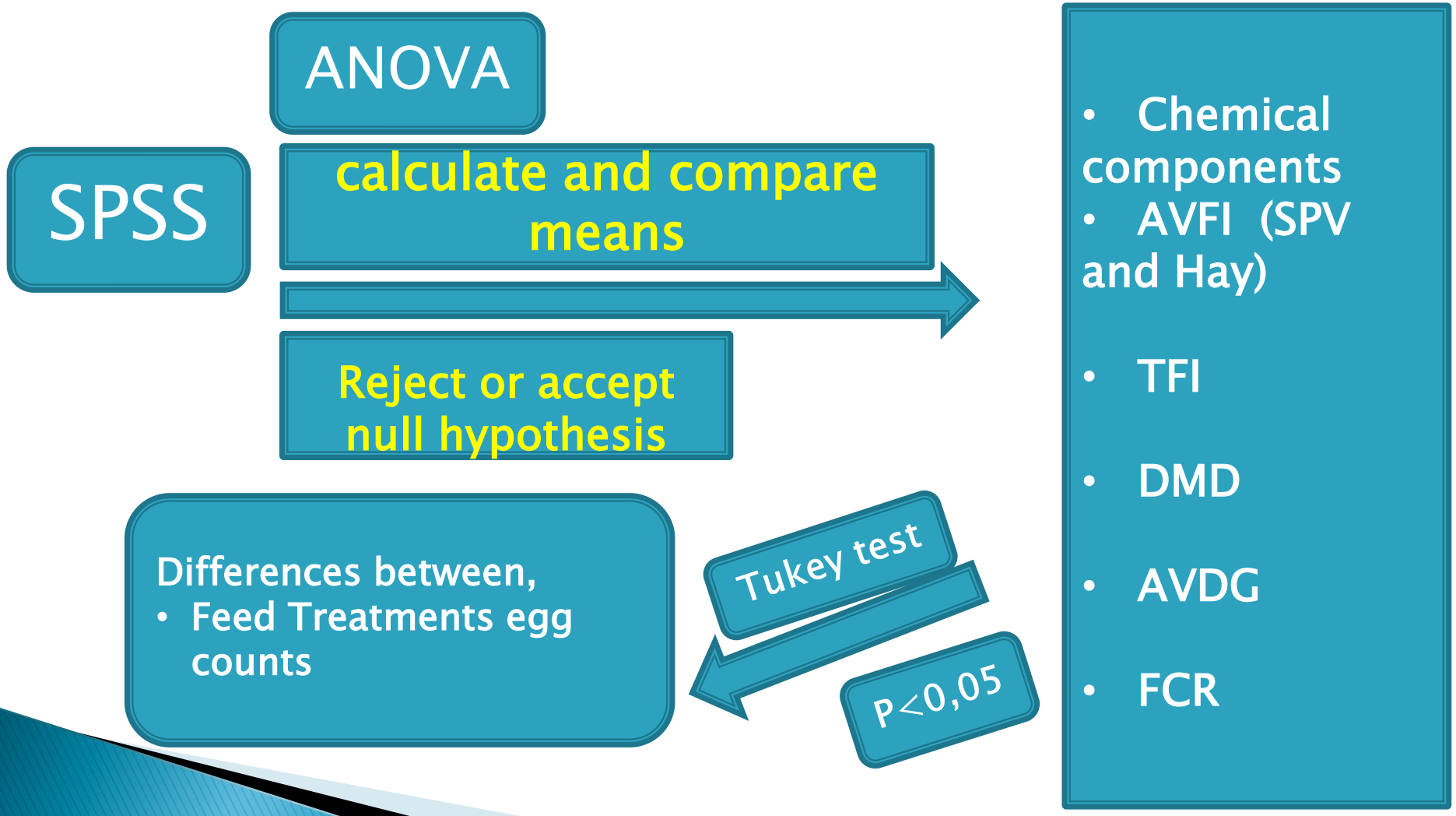
FAMACHA to illustrate anaemia levels in goats

FAMACHA© chart is an eye coloured based stratification method, with five colour categories of the conjunctiva membrane.

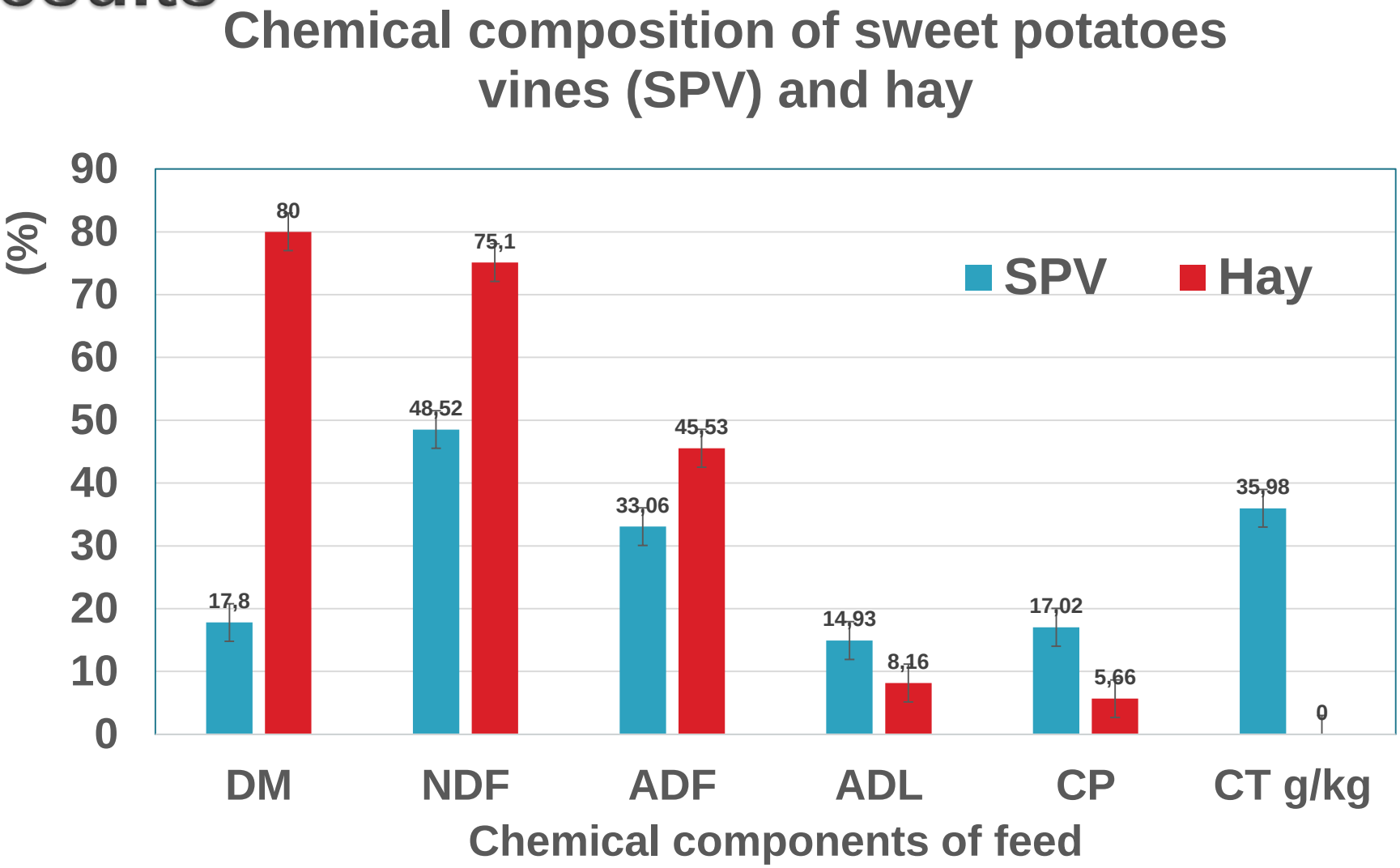
Feacal egg count (FEC)

FEC was counted using modified McMaster Technique

Statistical analysis …



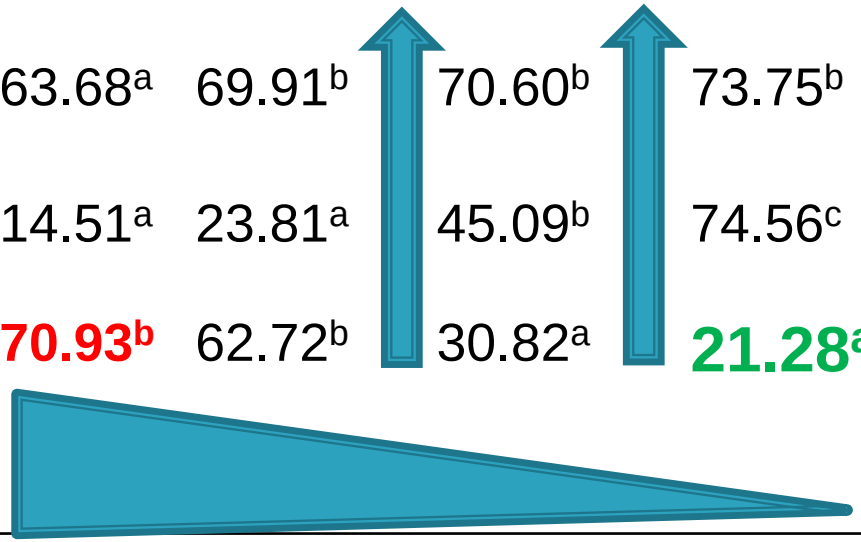
Results


Chemical composition of sweet potatoes vines (SPV) and hay
(%)
90
80
70
60
50
40
30
20
10
0
SPV
Hay
80
75,1
48,52
45,53
33,06
17,8
14,93
8,16
17,02
5,66
35,98
0
DM
NDF
ADF
ADL
CP
CT g/kg
Chemical components of feed

Results

Effect of different feeding levels on feed intake, dry matter digestibility and average daily gain of goats

Parameters	T0	T1	T2	T3	SED	Sig
AVFI kg Hay/day	0.95^{a}	0.96^{b}	0.97^{c}	0.98^{d}	0.02	0.000
FI SPV kg DM/day	0.00^{a}	0.27^{b}	0.36^{c}	0.53^{d}	0.04	0.000
TFI kg/day	0.95^{a}	1.28^{b}	1.36^{c}	1.57^{d}	0.04	0.000
DMD%	63.68^{a}	69.91^{b}	70.60^{b}	73.75^{b}	0.96	0.001
AVDG g/day	14.51^{a}	23.81^{a}	45.09^{b}	74.56^{c}	0.00	0.000
FCR (g DM kg^{-1} BW gain)	**70.93^{b}**	62.72^{b}	30.82^{a}	**21.28^{a}**	4.85	0.000



Results

Treatment	IFAM scores	FFAM scores	IEPG	FEPG	%RED
T0	3.00	2.95	631.00[a]	1012.00	**-60.38**
T1	2.88	2.38	3250.50[b]	1012.00	**+68.87**
T2	3.00	2.56	4187.50[b]	1337.00	**+68.07**
T3	3.00	2.38	4350.00[b]	925.00	**+78.74**
SED	0.19	0.82	128.78	10.51	10.80
P-*value*	0.94	0.42	0.00	0.35	0.05

Conclusion

- Do potatoes vines have feed potential ? Yes
- Anthelminthic potential ? Yes
- What component of the extract is killing larva ?
- Not clear but CT was present, types of phenolic compounds ?
- Need for more research, quantity and chemical components with anthelminthic activity

Thank you to the EAAP 70th Annual Congress Sponsors and Friends

Platinum sponsor

nuscience
safe & innovative nutrition

Silver sponsors

ORFFA

EASTMAN

Circular Organics

Bronze sponsors

ADIFO SOFTWARE

ANKOM TECHNOLOGY

Cargill

INVE

iCEROBOTiC

KEMIN
INSPIRED MOLECULAR SOLUTIONS

DEPARTMENT OF AGRICULTURE & FISHERIES

AVEVE Biochem

agolin

proviron

pancosma
makes sense

ThermoFisher SCIENTIFIC

provincie Oost-Vlaanderen

THANK YOU