Integrating innovative TECHnologies along the value Chain
to improve small ruminant welfARE management

Trough AI

The impact of “smart” water trough on sheep and goats’ animal welfare

Ilan Halachmi, *Assaf Godo, Joseph Lepar, Gili Shalit Mishal*

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Volcani Institute, **Israel**

Agricultural Engineering

Precision Livestock Farming (PLF) Lab

TECH CARE

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The impact of “smart” water trough on a sheep and goats’ animal welfare

PLF development from TRL-2 to 8.

Prototyping – timeline and challenges

PLF development from TRL-2 to 8. Is it a blue-print for Animal welfare monitoring ?

Holistic One Health: *Full Nutrient Recycling*

2017

Begin R&D on weight/health correlation

Can we identify weight changes in the relevant resolution

High /L RFID

Kendel

2018

Begin work on the hardware device

2019

Introduce professional 4 legged device to the field

Seasonal

2020

Begin work on 2-legged weighing device

TechCare

Mar 2021

The year of SW, AI, DL and Plastic

2022

From POC to product

Key Takeaway: You Don't Have to Learn the Hard Way.

PLF technologies in SR

2017 2018 2020 2021

Hardware development

Improving Animal Welfare management: Caring for the individual animal

Comp., sensing & communications systems:
› Real-Time Data Processing, **AI Based Insights**

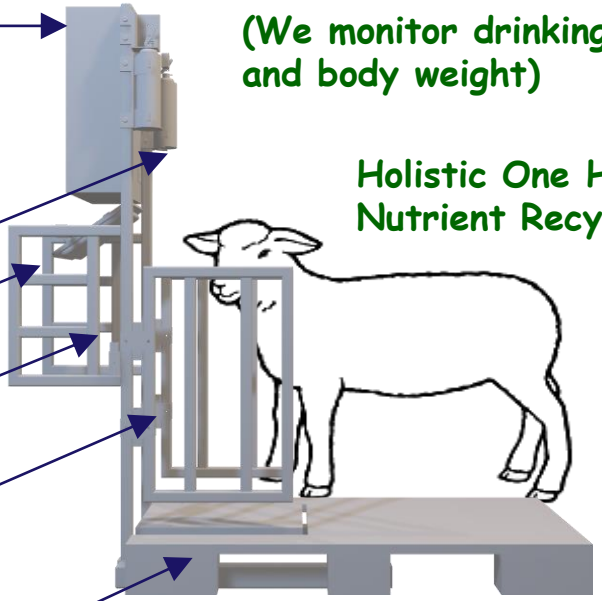
Two paints marking system: (1) Easy Sorting
(2) Automated Animal Marking

Individual identification

Pre-existing water trough:
› Simple Integration
› Modular To Fit In Every Farm
Monitor water flow, quantity, and attendency

Optic sensor: Intake Validation; Livestock Management

Body weight Scales: Efficiency Automated Weight Data Collection



(We monitor drinking behaviour and body weight)

Holistic One Health: Full Nutrient Recycling

Our "precious" invention

Monitoring Animal Welfare

Solution adaptability and practicality:

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Our PLF lab is happy to cooperate

Halachmi@volcani.agri.gov.il

Hardware development

Holistic One Health: *Full Nutrient Recycling*

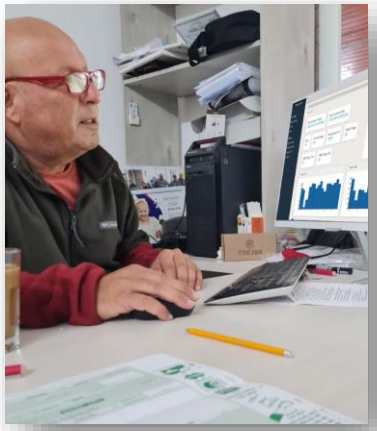
- Water is provided only in the trough.AI
- learned from their mothers

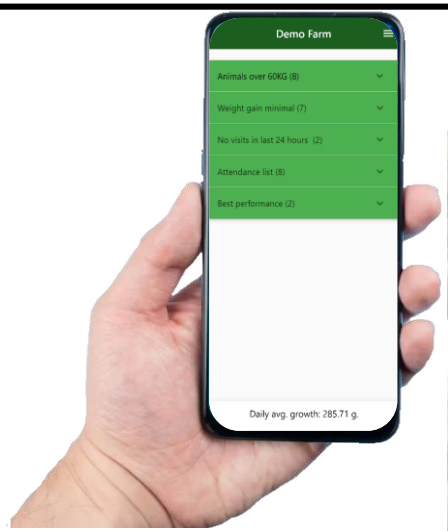
Halachmi@volcani.agri.gov.il

Algorithms and software development

The Farmer side

PLF technologies at hand





Objective Phenotyping

'Fast growers'

Borrowed from Alon Bar Shamai MSc thesis

Halachmi@volcani.agri.gov.il

Data interpretation from the Trough.AI

Results 1/5

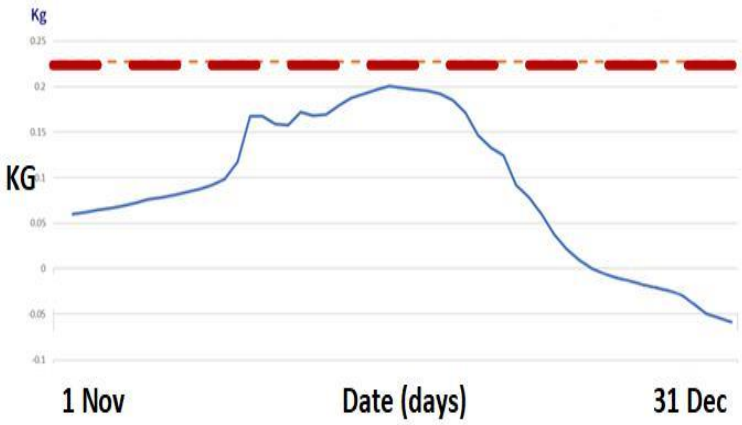
Animal health and welfare

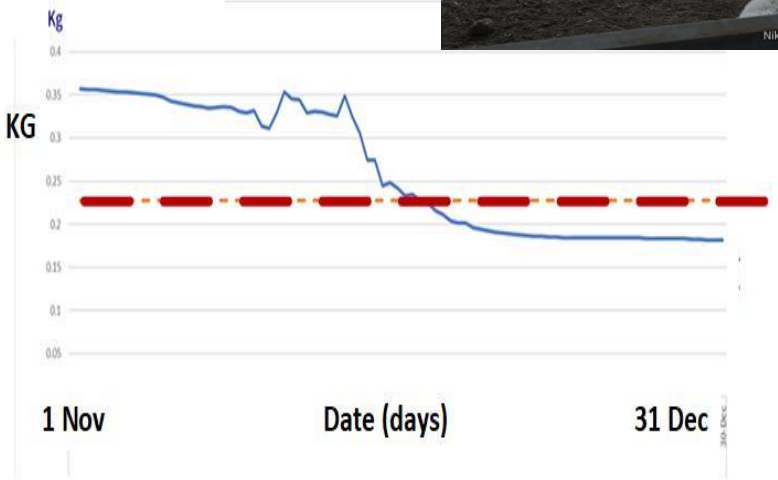
Lameness, injuries and illness that impact voluntarily access to food and water

Financially sig. events (body weight changes)

Animals to never breakeven(e.g. 608) Animals becoming in-efficient* (e.g. 396).

*in-efficient daily growth is less than daily feed cost



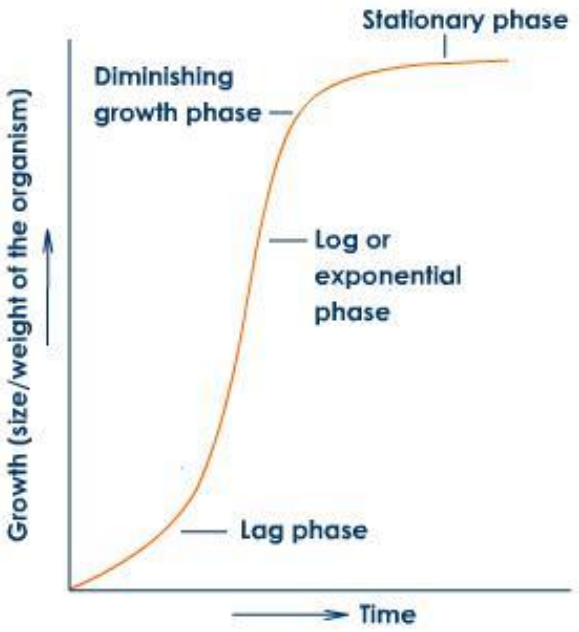


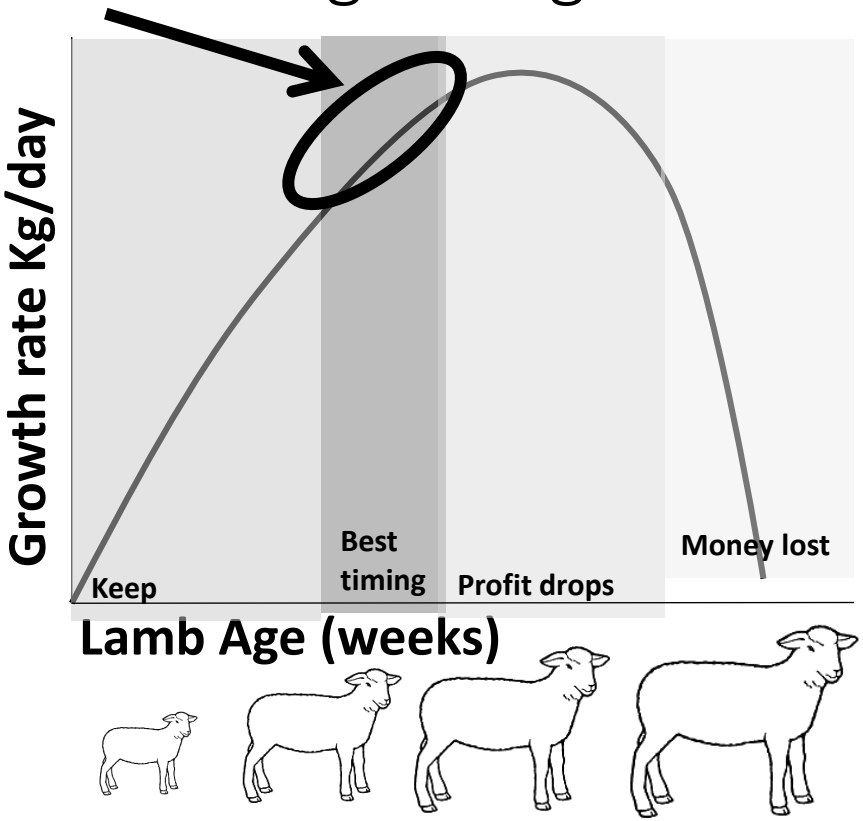
Lamb 489 growth rate in kg is under the breakeven line of 0.227Kg for the entire duration.

Lamb 396 dropped under the break-even line and became loss on Nov. 17th

Exploitation of research results

Optimal marketing timing

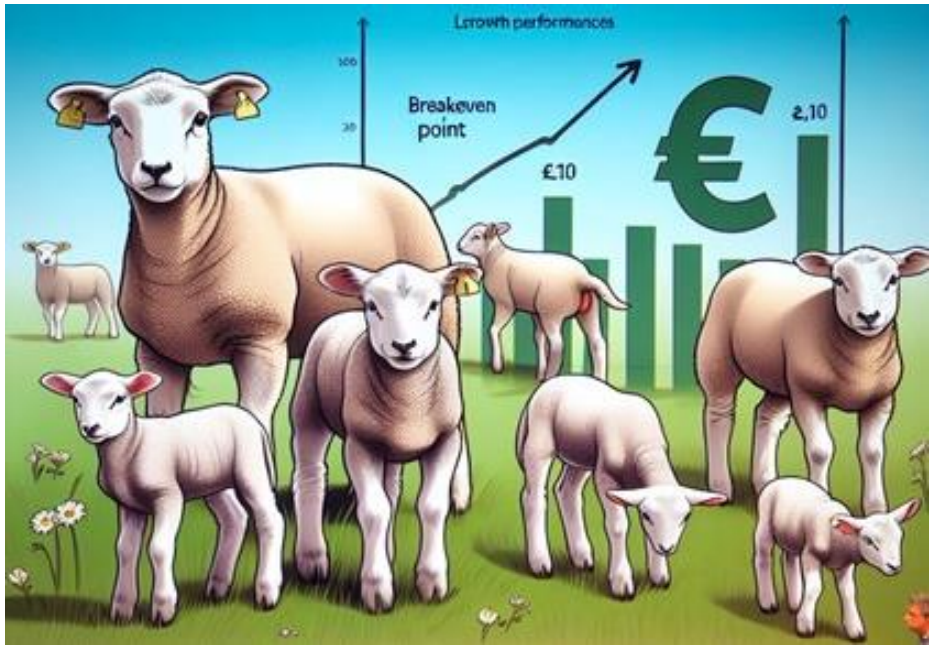




- Helping farmers reduce economic losses through better **animal health and welfare**
- Informing policy on livestock welfare
- Creating tools & guidelines for early detection of growth issues and health in lambs

Economic Impact of Growth Performance in Lambs

Key Findings from the Study (n = 53 lambs):



17% (9 lambs) never reached the breakeven point

- → 100% loss on these animals
- → Estimated feed cost loss: €286

43% (23 lambs) showed a growth breakpoint

- → Suboptimal growth performance
- → Estimated feed cost loss: €665

Total Avoidable Loss: €951

- → Equivalent to the profit from 12 healthy lambs
- → Represents 22.6% of the entire group

Takeaway:

- Improving early detection and intervention in growth performance can significantly enhance **both animal welfare and farm profitability.**

Holistic One Health:

Animal-welfare aspects listed in the Farmer's Benefits

- ✓ Keeping track of herd drinking patterns. (heat stress)
- ✓ Lowering herd mortality by detecting illnesses earlier.
- ✓ Minimizing feed waste for those animals that do not gain weight effectively.
- ✓ Targeted marketing of efficient (or inefficient) animals (phenotyping, breeding)
- ✓ Thorough and individual tracking of the weight – **monitoring pregnancies**.
- ✓ Streamlining weighing procedures.
- ✓ Observing herd growth and monitoring animal weight.

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Exploitation of research results (Cont.)

TechCare developed technologies could open new market opportunities for products derived from healthier and more productive livestock

The impact of a “smart water trough” on a sheep and goats smallholder farm. A Bar-Shamai,, Halachmi et al... 11th European Conference on Precision Livestock Farming, 1208-1215

EuroTier
First in animal farming.
12 – 15 November 2024
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Adoption and Dissemination of Technologies:

From academic research to on-farm application