Webinar Series: Livestock & Livelihoods

WEDNESDAY, JULY 7
9 A.M. EST | 4 P.M. EAT

Leveraging Livestock to Combat Malnutrition:
Perspectives From East Africa
<table>
<thead>
<tr>
<th>Tech Tips</th>
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<tbody>
<tr>
<td>• <strong>Do not use your built-in computer</strong> microphone; use a USB-headset with integrated microphone, or wired cell-phone earphones/mic, <strong>not Bluetooth</strong>. An external USB-wired microphone is the next best solution.</td>
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<td>• <strong>Put your full name and organization</strong> - Tsehay Gashaw (ILRI)</td>
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<td>• <strong>Close captioning</strong> has been enabled</td>
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<tr>
<td>• <strong>Microphone off</strong> when not speaking, please.</td>
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<td>• <strong>If you can’t hear or see</strong>: close and restart zoom, close other programs.</td>
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<tr>
<td>• <strong>Use the chat</strong> to post comments or questions during the presentations. Create a conversation!</td>
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<tr>
<td>• <strong>Video is optional</strong>, be aware that others may have less bandwidth than you.</td>
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<td>• <strong>The session is recorded</strong> - audio, video and chat - and any private chats are also visible to the organizers.</td>
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Leveraging Livestock to Combat Malnutrition: Perspectives from East Africa

John Ellenberger
Executive Director
Venture37
Video: A Spotlight on East Africa: Nutrition and Livestock in Rwanda
Leveraging Livestock to Combat Malnutrition: Perspectives from East Africa

Lora Iannotti
Associate Professor, Public Health
Washington University in St. Louis
Building the Narrative:
Livestock in Sustainable Healthy Diets

Lora Iannotti, PhD
Associate Professor
Director, E3 Nutrition Lab
Washington University in St. Louis

Food Security Webinar: 7 July 2021
Livestock: An essential part of addressing the lifelong debilitating effects of stunting and malnutrition
Key Messages

• Stunting affects 144 million young children globally (21.3%), with serious consequences for growth and brain development (SOFI 2020)

• LDFs can play a critical role in alleviating stunting and malnutrition, but there are large consumption disparities

• LDFs provide limiting nutrients in highly bioavailable matrices, thus are powerful in abundance and in scarcity

• Epidemiological evidence supports the need to ensure access to LDFs during certain periods of the life course - childhood, pregnancy and lactation, and old age

• Action is needed to rebalance food systems and support sustainable, mixed livestock production to safeguard human, animal, and planetary health
Nutritional importance of LDFs
Bioavailability & Epidemiology
LDF consumption disparities

World

Europe

Africa

Asia
LDFs are nutrient-dense and bioavailable

- **Protein**: Digestible indispensable amino acid score of eggs and milk >100%, compared to 37% rice, or 45% wheat
- **Fatty acids**: DHA and other PUFA found in LDFs, but also saturated/trans fats
- **Vitamins**: A, B3 (niacin), B6 (pyridoxine), B12, D, choline
- **Minerals**: Ca, Zn, Fe, Se concentrated in LDFs
- **Bioactive factors**: taurine, creatine, carnosine
## Nutrient matrix: bioavailability of LDFs

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>LDF Matrix</th>
<th>ASF vs PSF absorption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vit A →</td>
<td><img src="image1.png" alt="Vitamin A structure" /></td>
<td>12-24x (ug)</td>
</tr>
<tr>
<td>Iron →</td>
<td><img src="image2.png" alt="Iron structure" /></td>
<td>2x (mg)</td>
</tr>
<tr>
<td>Zinc →</td>
<td><img src="image3.png" alt="Zinc structure" /></td>
<td>2x (mg)</td>
</tr>
<tr>
<td>Choline →</td>
<td><img src="image4.png" alt="Choline structure" /></td>
<td>-</td>
</tr>
</tbody>
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*Image: ILRI (A. Slater)*
Epidemiological evidence → differences by life course phase

- Infants and young children
  - Cochrane review five studies ASF in 6-24 mo increased HAZ (Eaton et al. 2019)
  - Systematic review ASF showed reduced stunting in one RCT and one cross-sectional study (Shapiro et al. 2019)

- School-age children
  - Cognitive function improved in meat group compared to milk & control groups; improved growth in both the milk and the meat groups (Neumann et al. 2007)
  - Children < 18 yrs from Asia showed meat consumption increased risk of overweight/obesity (Yang et al. 2012)

- Pregnant and lactating women
  - Systematic review showed maternal supplementation with animal protein increased birth weight (Pimpin et al. 2019)

- Adults
  - Processed meats linked to colorectal/other cancers, cardiovascular disease, and diabetes
  - Prospective studies in high-income countries showed ↑all-cause mortality rates associated with high red and processed meat compared to low quantities; no association or inverse for poultry (Godfray et al. 2018)

- Elderly
  - Systematic review showed cow milk protein supplements preserved muscle mass and sped recovery after hospitalization in the elderly (Zanini et al. 2020); Meta-analysis of milk protein combined with resistance training improved fat-free mass (Hidayat et al. 2016)
  - Meta-analysis of cohort studies showed no association between milk intake and hip fracture in women but more data needed in men (Bischoff-Ferrari et al. 2010)
E3 Nutrition Lab Research Findings

• Ecuador Lulun Project
  - RCT to test efficacy of eggs in early complementary feeding period
  - Linear growth increased by 0.63 LAZ, stunting reduced by 47% (Iannotti Pediatrics 2017)
  - Choline increased by 0.35 and DHA by 0.43 effect sizes (Iannotti et al. AJCN 2017)

• Samburu Milk Nutrition in Pastoralists
  - Livestock ownership increased nutrient adequacy for vitamin A, B₁₂, and zinc (Iannotti and Lesorogol CA 2014)
  - Milk consumption increased BMI z scores among youth (Iannotti and Lesorogol AJPA 2014)
  - Cattle and chicken ownership increased dietary diversity
Taking Action
UN Nutrition paper & Global Nutrition Targets
UN Nutrition Paper

- Recently launched this consensus document to build the narrative around LDFs in sustainable healthy diets. Its conclusions align with key messages today:

- Implications of LDFs depend on: 1) context, 2) life course phase, and 3) production system
  - Nutrition inequities prevail globally, notable LDF apparent dietary intake patterns
  - LDFs provide critical nutrients in bioavailable matrices
  - Ensure LDF access for children, pregnant/lactating women, and elderly
  - LDF production has serious impacts on the environment but opportunities exist to mitigate climate change and environment impacts

- Rebalance food systems for equitable LDF consumption and support sustainable, mixed production systems to protect human, animal, and planetary health
Taking action

• ENABLING ENVIRONMENT
  • Equitable Food Systems – protect affordability ASF, diverse high quality diets for all
  • Policies & Programs - ensure access in critical stages of life course, social and behavioural change, FBDG

• PLANETARY HEALTH
  • Mitigating environment impacts of LDF production – mixed farming systems, adaptation to local environments, and sustainable animal types
  • One Health principles – small-scale producers, women farmers, efficiencies in feed-conversion rates, local breeds, etc.

• RESEARCH AND INSTITUTIONS
  • Research – build evidence-base for LDFs, biodiversity/diet diversity, bidirectionality of climate change and LDFs
  • Institutional commitments – UN Nutrition, ILRI, UN Decade on Nutrition
In sum, LDFs can play an important role in meeting **Global Nutrition Targets** – stunting, anemia, and LBW – and achieving **SDGs 2** (zero hunger), **12** (responsible consumption and production), and **13** (climate action).
E3 Nutrition Lab

Research to identify interventions that promote healthy growth and development in the most vulnerable populations globally, with the following criteria:

- Equitably accessed
- Evolutionarily appropriate
- Environmentally sustainable

Research sites: Ecuador, Haiti, Kenya, Global
Role: scientific perspective and infuse evidence-base
Rapid Fire Presentations

Rwandan cheese producer checks for quality of the product. Photo credit: Land O'Lakes Venture37
Leveraging Livestock to Combat Malnutrition: Perspectives from East Africa

Presenters:

**Joachim Balakana**  
National Coordinator  
Venture37 Tanzania,  
Technical Lead of Dairy Nourishes Africa  
Tanzania Pilot Project

**Getnet Assefa**  
Senior Technical Services Support Livestock Specialist  
Venture37

**Emily Ouma**  
Agriculture Economist  
International Livestock Research Institute

**Tadesse Zerfu**  
Public Health Specialist and Marie Skłodowska-Curie Actions Post-Doctoral Research Fellow  
Global Academy of Agriculture and Food Security, University of Edinburgh, UK
Improving Access to Animal Sourced Foods

Joachim Balakana
National Coordinator
Venture37 Tanzania,
Technical Lead of Dairy Nourishes Africa Tanzania Pilot Project
Demand | Tanzanian population has nutrition challenges that could be addressed through increased access and consumption of dairy products

Western and central parts of Tanzania have significant stunting challenges...

...14 regions have over 100k children that are affected by stunting in their population

Source: Bain Analysis; TNNS Cross sectional household survey outputs (2018), Ave. ~96k kids / region

Categorization to be validated

Prevalence %
40 42 26 39 37 20 26 93 34 36 26 41 48 43 30 25 47 54 30 24 20 24 20 22 21 24 21

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How DNA will address these challenges – DNA strategic framework

Aligned with Government Priorities and Policy

Grow Consumer Demand
- Deliver behavior change strategies and consumption and nutrition campaigns
- Incubate innovative distribution models
- Support school milk programs

Drive Enterprises to full potential
- Accelerate and incubate dairy enterprise growth by optimizing operations for scale
- Implement and scale sustainable business models for inclusive, farmer-allied operations

Increase Farmer Production
- Equip farmers to enhance on-farm productivity and economics
- Implement and scale business models that increase access to appropriate inputs, services and technologies
- Strengthen aggregation models that link commercially-oriented farmers to markets

Strengthen Operating Environment
- Increase food safety and quality
- Increase access to capital
- Improve industry data and accessibility
- Enhance industry advocacy

DNA Principles
- Demand-led
- Environmentally sustainable
- Agile and adaptive
- Gender and youth inclusive
- Data-driven

Transform African dairy industries by creating vibrant ecosystems of farmer-allied and environmentally sustainable enterprises that improve nutrition, enhance livelihoods, and stimulate economic growth.
Dr. Getnet Assefa
Senior Technical Services Support Livestock Specialist
Venture37

Growth through Nutrition Activity (GTN)
Demand generation | DNA has started implementing high-impact school milk promotions with three processors, targeting ~4,000 children across 20 schools

Taking action with a data-driven, sustainable approach

- DNA commissioned a **study** to assess **dairy consumer demand** in Tanzania, which identified:
  - Need for a dairy **consumer awareness** campaign
  - School milk consumption has **lasting impact** on behavioral change in society

- DNA engages public & private sectors to ensure sustainability

**DNA deploys processor-led school milk efforts**

- Selected **three DNA processors** and identified target schools in their districts
- Trial of **innovative models** is aligned with Government of Tanzania priority of finding more sustainable mechanisms
Test viability for schools to grow demand

- We support processors to **test and iterate** on multiple models to grow demand:
  - Cost-sharing **equipment purchases**
  - Supporting design of **student nutrition curriculum / educational programming**, 
  - Co-sponsoring **awareness and behaviour change campaigns**

- We engage ~20 schools >4K children and >5K other community members
  - Program will **measure reported changes in preferences** within community and provide feedback to processors to inform sales strategies
93% of children <2 years did not receive a MAD (minimum acceptable diet)

57% anemic

38% stunted

Why Growth through Nutrition works on access to …

Staples
Pulses
Oil crops
Fruits & vegetables
GTN Intervention Pillars

- Increased access to diverse, safe & quality foods
  - Promote sustainable approaches to produce
  - Promote post harvest handling technologies
  - Increase women participation in IGAs (women empowerment)
  - Strengthen government & private sector

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Project Approach – Key use of Animal Sourced Foods (ASF) as part of Diversified Diet through promotion of Nutritional Sensitive Agriculture (NSA)

Measure of success – Reduction in MVHH Hunger from 48% to 11%

Project Approach – Focus on improved access to nutritious foods

Measure of success – Women receiving diverse diets increased from 2% (2017) to 16% (2021) – still a long way to go

Project Approach – Focus on Local solutions – fertile hatching eggs, post harvest storage, savings and assets building

Measure of Success - Children who consumed 4 out of 7 food groups increased from 12% (2017) to 34% (2020)

“Chicken production is a science, to be successful I will teach the farmers before selling eggs and follow-up after.”

– A Model Farmer
Impact of *Girinka* program and *Gabura Amata Mubyeyi* (*parents, give milk*) intervention in Rwanda

Emily Ouma, Agriculture Economist, ILRI

July 7, 2021
EVALUATION DESIGN OF THE SBCC INTERVENTION - CLUSTER RANDOMIZED CONTROLLED TRIAL

1. Effect of the Girinka program on milk consumption and nutritional status of young children

2. Effect of the SBCC intervention on milk consumption, dietary diversity and nutritional status of young children in Girinka hh

- Girinka plus SBCC
  - 229 HHs with a Girinka cow

- Girinka only
  - 229 HHs with a Girinka cow

- Girinka eligible
  - 229 HHs without a Girinka cow but eligible for a cow
The SBCC messages were developed for the following 6 key elements:

• Importance and **benefits** of cow’s milk and ASF consumption for pregnant and lactating women and young children

• Appropriate daily **quantities** of ASFs and cow’s milk for pregnant and lactating women and young children

• Appropriate **time to introduce** ASFs and cow’s milk for pregnant and lactating women and young children

• Importance of identifying symptoms of **milk allergy** and intolerance and the actions to take

• Importance of **hygiene and safe handling & storage** of fresh milk

• Importance of **male engagement** for maternal and child nutrition and increase of cow’s milk and ASF consumption
### KEY RESULTS

- Girinka program had a positive effect on child milk consumption, child nutritional status, and household food security

<table>
<thead>
<tr>
<th></th>
<th>Has Girinka cow (N=459)</th>
<th>Eligible for Girinka cow (N=223)</th>
<th>Difference (ATT)</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child had milk 2 or more times in 7 days</td>
<td>43.1%</td>
<td>21.6%</td>
<td>21.6%***</td>
<td>0.044</td>
</tr>
<tr>
<td>Household food insecurity access score, range 0-27 (lower = more food secure)</td>
<td>12.4</td>
<td>13.7</td>
<td>-1.3***</td>
<td>0.813</td>
</tr>
<tr>
<td>Measures of stunting and underweight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight-for-age z-score</td>
<td>-0.7 SD</td>
<td>-0.9 SD</td>
<td>0.2***</td>
<td>0.114</td>
</tr>
<tr>
<td>Height-for-age z-score</td>
<td>-1.7 SD</td>
<td>-1.9 SD</td>
<td>0.2**</td>
<td>0.141</td>
</tr>
</tbody>
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**P<0.01; ***P<0.001; ATT, average treatment effect on the treated; SE, standard error**
**KEY RESULTS**

- *Gabura Amata Mubyeyi (Parents, give milk) SBCC intervention:*
  - Improved maternal knowledge of ASFs
  - Increased frequency of weekly milk consumption among children

![Graph showing percentage increase in milk consumption among children](image)
Effect of Livestock Ownership on Health and Nutritional status of women and children Low and Middle-income settings

TADDESE ALEMU ZERFU, MPH; PHD
TRAIN@Ed Marie Skłodowska-Curie Actions Research Fellow
Global Academy of Agriculture and Food security (GAAFS)
University of Edinburgh (UoE), UK
Rationale

• Despite well known benefits, there are evidence on contradicting impacts of livestock keeping on the health status of children and women,
  • Mainly through contamination and exposure to microbes
• Yet, there is limited synthesized evidence elucidating the effect of livestock keeping on health and nutritional outcomes of vulnerable population groups
• This systematic review
  • searched 24 scientific databases (key words)
  • two reviewers screened all titles/abstracts & full texts to avoid possible biases
  • Data extraction - 1 reviewer, checked by another
From more than 50,000 studies to 178…

PRISMA flow diagram reporting the various studies

51,546 references imported for screening

34,402 studies screened against title and abstract

17,144 duplicates removed

33,737 studies excluded

659 studies assessed for full-text eligibility

481 studies excluded
- 123 No health or no nutrition outcomes
- 90 Wrong countries
- 88 Study does not include women of reproductive age and/or children under 5 years
- 56 No comparison data
- 39 No livestock keepers
- 28 Not primary empirical research
- 16 Duplicate report of data
- 15 Percentage of children of under 5 or women of reproductive age less than 50%
- 12 Not in English or French
- 9 No effect of livestock ownership alone
- 2 Opinion-based studies
- 2 Report
- 1 No reference group for comparison

178 studies included
Adverse Health Effects

- Acute gastrointestinal illness
- Ancylostoma ceylanicum
- Asthma
- Brucellosis
- Sickness in children (several infections)
- Campylobacter, Campylobacter-associated Diarrhoea
- Child diarrhoea
- Child anaemia
- Cryptosporidium Diarrhea in Early Childhood
- Cxiella burnetii

- Crimean Congo Hemorrhagic Fever Virus
- Dengue fever
- Diarrhea
- Enterotoxigenic Bacteroides fragilis (ETBF) related diarrheal
- Genomic Toxoplasma gondii DNA and Anti-Toxoplasma Antigens
- Flulike illness
- Giardia
- Human fascioliasis infection
- Leishmania donovani infection
- Helminth infections
- Intestinal protozoan infections (Giardia duodenalis, Entamoeba histolytica, Cryptosporidium, Ascaris lumbricoides, Schistosoma mansoni, Hymenolepis nana and Enterobius vermicularis).
Nutrition Outcomes

- Child wasting
- Child severe protein malnutrition
- Child stunting (HAZ)
- Child weight and height growth
- Child nutritional status
- Anemia of women
- Child WHZ, WAZ, and HAZ indices
- Child Zinc deficiency

Each Dot = Two articles
Half (○) = One article

○ Positive association

No (neutral) association

Negative association
A chicken enterprise of Tanzania’s Elizabeth Swai. Photo credit: ILRI: Stefano Bianco
Leveraging Livestock to Combat Malnutrition: Perspectives from East Africa

David Harvey
Technical Director
Venture37
Leveraging Livestock to Combat Malnutrition: Perspectives from East Africa

Isabelle Baltenweck
Program Leader, Policies, Institutions and Livelihoods
International Livestock Research Institute
Thank you for participating!

Follow us for details on the next webinar in our Livestock & Livelihoods series.

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@LandOLakesV37

Ethiopian girl drinking milk produced by her family's cow. Photo credit: ILRI:Apollo Habtamu