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METHODS AND APPROACHES FOR EXTENDING DRY SEASON LACTATION IN LIVESTOCK IN SAMBURU AND TURKANA COUNTIES

MILK AVAILABILITY STUDY LEARNING BRIEF

INTRODUCTION & RATIONALE

Milk has been integral to pastoralist nutrition for centuries, and its importance to child health is well established (Sadler et al, 2010 and Iannotti & Lesorogol, 2014). Milk is especially important in providing bioavailable B vitamins, vitamin A, calcium and protein, important nutrients that are commonly deficient in the 'high energy' diet commonly consumed in all but the peak of the wet season (Save the Children, 2017). The Milk Matters study in Ethiopia demonstrated that providing supplementary fodder and veterinary care to milking animals that stay close to women and children during the dry season has a protective effect on child nutrition and provides an alternative to therapeutic feeding (Sadler, et al, 2012). However, the high cost of the intervention, and its reliance on external actors for animal health and provision of animal feed limited the replicability, scalability, and effectiveness of such interventions. USAID Nawiri, through the Milk Availability Study (MAS), set out to identify practical approaches to extend dry season lactation in milking animals and increase the availability of milk in households with children under the age of 5 and women of childbearing age. There is a wealth of research on technical approaches to increasing milk production through improved feeding and breeding. USAID Nawiri expanded on this research and sought to understand why adoption of these practices remains low and, in communities where improved

breeds had been distributed, whether it made a difference in milk consumption over the long term. To generate the evidence needed to inform future program design, the program explored the efficacy of three approaches to increasing milk production i) Resilience Design (agro-ecology); ii) fodder production (green and conserved) and; iii) species and breed improvement.

This learning brief shares insights generated from Phase I and recommends approaches and programming to increase dry season milk production within livestock-owning households to reduce the need for external investments when pasture resources are typically unavailable.

Pathways to milk availability and consumption

This Learning Brief focuses on the direct ‘production to consumption’ pathway to making milk available to households. Broader discussions of market-based and other options for improving access to milk and the relative costs and benefits associated with both, and insights into alignment of approaches within livelihood zones are covered elsewhere. The 2017 Cost of Diet Study report for Turkana states that milk’s value towards a nutritious diet outweighs its cash value (Save the Children, 2017). Findings from the USAID Nawiri 2021 Cost of Diet studies in Samburu and Turkana counties re-confirm this statement. Adding milk to the diet (milk that is produced or provided at minimal cost) reduces the overall cost of a culturally preferred nutritious diet by 10% and 17% in very poor and poor households respectively. The milk culture across the two counties is diverse with goat, sheep, cow and camel milk as well as powdered and packaged UHT milk. In Samburu, packaged UHT milk is more frequently consumed with powdered milk being rarely or never consumed. In Turkana, the proportion is inverse, powdered milk is frequently consumed and UHT rarely¹. Fresh milk is seasonally dependent and acquired through home production, neighbors and extended family members as well as through milk sellers in markets and door to door sales. Prices vary for different milk products and every family manages its own resources as best as possible to maintain a year-round supply of milk to the household. Food from livestock products (milk and sometimes meat) in very poor and poor households comprised less than 5% and 10% of the minimum food requirements (2100 kcals/person/day) in Turkana and Samburu respectively (Nawiri, 2021a and Nawiri, 2021b). This is a result of small herd size and inadequate feed and water reducing daily yield and lactation duration.

LEARNING JOURNEY

During Phase I, USAID Nawiri used a range of activities to discover information and deepen our collective understanding of the nuanced relationships between milk production and persistent global acute malnutrition (P-GAM) in Samburu and Turkana. Activities included desk reviews, county and community consultations, collaborative interrogation of research findings through a nutrition lens, and structured conversations to distill insights from staff and partners. During the launch of research activities, meetings to capture learning priorities were held with county officials where the county’s learning priorities were integrated into research objectives. Key informant interviews were held with

¹ The Cost of Diet study refers to this as the Food Habits Nutritious Diet or FHAB.

county officials and community members to understand experiences and outcomes of previous forage and breed improvement interventions. Two training sessions were provided by two Resilience Design (RD) consultants in Samburu and Turkana to initiate engagement with the program staff, community members and local leaders on a journey towards testing the applicability of this approach to improve fodder production via climate-smart water and soil regeneration and management. Training sessions included two days of workshop-style overview discussions for county officials followed by a 3-4 day practical training that included community members. Practical sessions were hands-on and required all participants to walk and survey the land, vegetation and water resources. Simple survey techniques and discussions of water flow were used to calculate slope and map the landscape. Through this participatory mapping exercise, land use plans were created and the foundational work of creating water systems to channel and capture water as well as tree planting and constructing barrier fencing from local materials was done. The participatory nature of these trainings yielded some of the most informative insights.

USAID Nawiri's insights have validated the importance of addressing water and soil production and management through practical demonstrations and solicitation of input and advice from community members, which they highlighted was crucially missing in past interventions. Great momentum has been gained through these practical trainings and expansion sites have been identified for Phase 2. This milk production sector of interventions centered on herd and natural resource management (NRM) will go through a continuous learning journey and will be closely linked to the work undertaken by USAID Nawiri's Governance for Nutrition sector of intervention (Purpose 4), and fall under the larger Resilient Livelihoods umbrella (Purpose 1) (see Governance and Systems Strengthening for Nutrition Learning Brief for more detail) which additionally links to Sub-Purpose area 3.2 of the ToC related to NRM. Phase I also deepened appreciation that the livestock sector remains key for resilient livelihoods in the face of climate change in order to improve household access to nutritious diversified foods, including for milk at the market and at the household level (see Building Resilient Markets in Food Systems Learning Brief).

INSIGHTS AND IMPLICATIONS

INSIGHT N°1: Approaching herd and resource management for milk production and human nutrition is a new way of thinking and greatly appreciated by county officials and community members. Greater support is needed to frame integrated thinking and break down programming silos.

Although intuitive for most pastoralists and agro-pastoralists, approaching herd and resource management through a human malnutrition lens potentially offers a more tangible method of monitoring prevailing conditions and well-being outcomes. Trainings completed with county officials and community members allowed participants to ground truth the ecological challenges limiting smallholder pastoralist productivity and to design and begin implementation of pilot sites.

The Government of Kenya's National Drought Management Authority (NDMA) tracks numerous indicators on natural resources, livestock productivity and household food practices, however there is minimal analysis across indicators and monitoring of trends.

Implications: USAID Nawiri has identified the opportunity to integrate a One Health lens to monitor change and prevent unintended outcomes. This approach recognizes that human, animal and environmental health must be considered together to prevent, detect and control diseases that can spread to humans and to ensure food safety. For example, even though consumption of milk has an important role in a nutritious diet, the relationship between livestock ownership and nutrition outcomes is less clear. Livestock is a potential pathway for disease-related drivers of malnutrition due primarily to fecal contamination, resulting in enteric dysfunction, especially in children (Chen, et al., 2021 and Christian, et al, 2019). Rapid analysis of secondary data early in the USAID Nawiri program identified potential positive correlation between rainfall and diarrheal diseases which are further explored through the ongoing Fecal Oral pathways study. An inconsistent trend between milk volumes and milk consumption requires re-analysis of historic data and ground truthing with community members, especially at sentinel sites to inform further adaptation to resilience design (RD) and food market interventions as these activities scale. Future monitoring activities will observe changes in trends in areas where resilience design principles and practices are applied; creating a greater opportunity to understand these complex systems.

INSIGHT N°2: Agro-ecological resilience design (RD) approaches resonate with communities. They see RD being closer to the traditional ways of managing natural resources. Models for developing and sustaining technical leads as well as cost-effective methods of designing and monitoring RD sites while also (re-)empowering local communities remains a challenge for broader application.

As much as RD and traditional resource management practices align, RD takes a more proactive approach to structuring the landscape to capture as much rainfall as possible; preventing soil moisture evaporation; promoting nutrient cycling, and planting for year-round green forage production. Skills and knowledge to evaluate the landscape and design techniques and planting plans requires practical experience and not just theoretical knowledge of ecology and agriculture. Sustained implementation of land use plans also requires local ownership from the household to the community level.

Implications: A mentorship approach will be adopted with two RD consultants to continuously support and guide county officials and USAID Nawiri staff through piloting the RD approach to fodder production for increasing milk availability year-round. A long-term viable model for future technical support to communities after the program has closed is still being defined through USAID Nawiri with community and county officials. A tentative model would include, in addition to training county (ward-level) officers, video guides to reading the land with support from digital tools.

INSIGHT N°3: Resilience-building activities need to integrate traditionally valued capacities. Through the RD approach, USAID Nawiri was made aware of traditional dry season and drought mitigation forages that are often devalued by government and NGO stakeholders. Pastoralist and agro-pastoralists households and communities have traditional methods of protecting themselves against drought that must be considered when designing RD sites and other livelihood activities that rely on rainfed agriculture. Well executed participatory approaches will integrate traditional knowledge and be adaptive.

Resilience Design methodology integrates at its center the traditional knowledge and social dynamics of resource management, including through strong community engagement and the strengthening of local governance systems. Agronomic practices applied under RD mirror some traditional practices, an observation that came out strongly in all communities where RD sites were established. In one instance,

an elder pointed out a shrub that is known to be available to goats when no other vegetation is around. This shrub is often identified for removal through large-scale rangeland rehabilitation programs.

Implications: It is unclear whether traditional knowledge is widely applied by communities but is not shared widely with people outside of the immediate community. Integrating community perspective and insights is the core of all participatory approaches. USAID Nawiri will update the Resilience Design Primer created during Phase I, integrating aspects of the Mercy Corps Ward Development Planning Process in order to design interventions that are not overly prescribed and can adapt to local contexts. Implementing this type of programming requires time and can have high staffing needs until communities and relevant stakeholders are trained and are immersed in the initiative. Further efforts will link traditional knowledge to NRM and pasture management interventions under Purpose 3, where pathways have been refined to more explicitly address shocks and stresses and link to nutrition outcomes. IO 3.2.1 Leadership manages rangelands with the goal of increasing milk production, livestock and agriculture productivity (reduce vulnerability to shocks) and IO 3.2.2 Communities rehabilitate and protect local natural resources to increase milk production, livestock and agriculture productivity (reduce vulnerability to shocks).

INSIGHT N°4: Household motivations for adoption of practices vary but often relate to herd management and adapting production systems to an ever-evolving socio-ecological context. Stronger efforts are needed to streamline research and extension on socioeconomic factors that affect livestock and milk production in order to significantly impact pastoral household livestock derived incomes and livelihoods.

Despite the cultural and nutritional importance of milk in the diets of rural households in Samburu and Turkana counties, milk production at the household level is low. Per animal milk yields (e.g., the amount milked) for sheep and goats averages 0.49 and 0.73 liters respectively, although yield per animal varies depending on point in lactation cycle and the health and nutritional status of the ewe/doe (Kihu, et al, 2015). Livestock ownership is a common indicator of wealth in pastoralist and agro-pastoralist livelihood zones in both counties (Food Economy Group, 2016). Livestock (poultry, goats, sheep, cattle and camel) are a form of wealth accumulation, income generation, social capital, and financial protection against future shocks for rural households throughout East Africa (Lai, 2007; Kariuki, et al., 2013; Hetherington, et al, 2017). The absence of livestock or a herd size that is too small to be viable strongly contributes to the chronic cycle of food insecurity in rural households. **A minimum of 4.5 tropical livestock units² (TLUs) per person is necessary to meet the basic food security needs of a household.** Maintaining 9 TLUs is preferred as it accounts for broader income needs and unexpected losses (sales, mortality) and protects a sufficient number of breeding animals. In reality, livestock holdings in Samburu and Turkana counties are below these minimum figures. In Turkana, very poor and poor households averaged 1-3 TLUs during 2019-2020 (Nawiri, 2021a & Nawiri, 2021b). In Samburu, the herd size is slightly larger with very poor and poor households averaging 0 to 10 TLUs, with greater livestock

² 1 TLU is equivalent to 250 kg of live weight or 0.7 head of cattle, 10 sheep, 11 goats or 1.0 camels. The number of TLUs needed to provide for a family can change based on livestock prices, livestock mortality and birthing rates as well as family size. For purposes of this paper, we use the TLUs as defined in the Household Economic Analysis.

holdings in northern and eastern pastoral zones which correspond closely with Samburu North and Samburu East sub-counties. Sheep and goats are the most commonly owned livestock in both counties. Households with small herd size are more apt to settle nearer other economic opportunities and formal social protection services (Akall, 2021). Settlement creates an alternative set of challenges for livestock keepers in a dryland context. Under traditional mobile and transhumant practices, animals move with the availability of forage and water; reducing grazing stress on any one location and allowing pastures to naturally regenerate. Because small herd sizes cannot sustain an entire family during migration, more family members are settling. Changing land use patterns and, especially in Samburu, the conversion of dry season pastures to crop-based agriculture place pressure on natural pastures and water points. (see insight n°4 - Water Security for Nutrition Learning Brief). This poor use and over-use of pastures effectively drives down the productive capacity (e.g., number of animals that can survive on the land) of the rangelands. Bare and compacted soils are unable to absorb and retain water, leading to flash flooding and failure to recharge aquifers. This results in a never-ending cycle of poverty related to increased pressure on pastures and water points, increasing degradation of land and further pressure on remaining water resources even in years when rainfall follows historic averages.

Implications: With small herds, very poor and poor households struggle to balance the inputs livestock need to be productive and the low yield (body weight, milk, offspring) due to poor animal nutrition, insufficient water and poor animal health. In small herds, and when feed and water resources are limited, households are unable to stagger birthing to manage a continuous supply of milk³. There is a general lack of understanding of adaptations to husbandry and herd management practices being undertaken by very poor and poor households as they try to maximize their livestock resources to meet the household's diverse short-term needs and long-term ambitions. As much as studies to date have sought to demonstrate alternative solutions, greater understanding of household motivations is needed and will be further investigated by USAID Nawiri. For example, sustained caretaking of new seedlings in one household in Turkana was motivated by the importance of providing leaves from short acacia trees, a highly palatable food for goats, to youngstock unable to browse on taller trees. The head of the household, a woman, noted that young goats were often sickly or died because of insufficient nutrition. USAID Nawiri will integrate human-centered design approaches into the program's livestock programming so approaches and resources directly speak to motivations and aspirations of community members. The program will also continue to deepen its understanding of interlinkages between human, animal and environmental health (One Health approach), alongside community health systems to contribute to nutrition outcomes. ToC pathways (IO 3.2.2, Outcome 3.2.1.1- 3.2.1.3) have been modified to address herd management for nutrition and not just income and tradition which are supported by inclusive rangeland management plans where community structures have the capacity (rangeland mgt, water, WDPs etc.) to monitor the quality of natural resources and to hold stakeholders accountable. This is also connected to improved water resource management under IO 3.2.3.

³ Goats and sheep lactate for 120 days postpartum. Milk volumes are greatest during the first 1/3 of the lactation cycle followed by a gradual reduction until the end of the lactation period.

INSIGHT N°5: Distributing improved breeds is expensive, has limited reach and the benefits are short-lived. Community breeding schemes that build from traditional herd management practices will maximize local genetic diversity and be more cost-effective. Emerging approaches in community-based breeding schemes hold promise.

Pastoralists manage their herds to promote desired traits such as body size, temperament, ease of birthing, milk production, disease tolerance and hardiness in difficult environments. Shifting community structures, decreasing herd size and changing production systems are eroding the ability of livestock keepers to manage breeding practices. ILRI re-introduced community-based breeding schemes in Ethiopia in 2009 (Haile, et al 2011). Based on a participatory methodology, this approach re-positions the community as the lead decision maker on which livestock traits to select for and how breeding animals are managed.

Implications: USAID Nawiri will apply the community-based breeding approach into its livestock strengthening activities. This aligns closely with current initiatives in both counties to strengthen breeding practices. The program will document the process adapted from ILRI's approach in Ethiopia and disseminate findings on priority traits as determined by the women and men in livestock keeping households. ToC modifications under outcome 1.1.1.1 have been refined to be more risk sensitive and specific to climate sensitive approaches and technologies including improved access and ability to interpret risk information. Intentional efforts will be applied to ensure that any new practices and techniques do not create an additional burden for women (Output 1.1.1.1.2).

CONCLUSION & PRIORITY AREAS FOR ONGOING LEARNING

Framing of the Milk Availability Study (MAS) was largely informed by i) Household Economic Analyses (HEAs) which captured livestock holdings and herd composition as well as ii) the Cost of Diet (COD) studies which modeled different pathways to a nutritious diet including milk consumption. Information generated through the MAS complements USAID Nawiri's research in water systems, market systems for nutritious foods, and labor market assessment. Because of the strong relationship between social dynamics and livestock and resources management, USAID Nawiri will continue to analyze existing data; namely integrating data from the longitudinal study and the social behavior change insight generation activity to deepen understanding of barriers and motivations involving the entirety of the household system that may not be captured when looking just at herd and resource management practices.

Similarly, there is general consensus across technical leaders on priority areas of improvement (breeding, feeding, water, animal health) but limited insights (evidence) on how to work differently for a better adoption of practices. NGO and county programs and extension services focus on technical training and provision of assets (animals) or inputs (seeds, fodder, animal health) but the impact of these interventions is largely short-lived. The cost-effectiveness of prevailing approaches remains inconclusive. Continued use of rangeland management, improved feeding and improved breeding practices is limited within communities. As much as improved practices are appreciated and known, barriers to sustained use persist. USAID Nawiri research findings to date point to the need for approaches that start with community dialogue to identify priorities and traditional knowledge and management systems while also facilitating understanding between issues within these complex socio-ecological systems. In the research design, USAID Nawiri questioned whether communities demonstrate increased interest and willingness to engage in agro-ecological/fodder/improved breeding practices when approached through a nutrition

and children's' well-being lens. Early evidence suggests that it does make a difference and USAID Nawiri will continue this line of inquiry over the life of the program.

As presented in the Water Security for Nutrition and the Governance for Nutrition Learning Briefs, a strong focus will be placed on the linkage between natural resource management, pastureland and water management, through a conflict-sensitivity lens. This will be central to the program's resilient livelihoods and milk production efforts for improving year-round consumption. In addition, control of land and land governance must be addressed to achieve scaled adoption of forage production. USAID Nawiri will support county government and communities in the development of community-led resource management and secured land tenure. The aim will be to advance reforms needed to guarantee pastoralists' right to mobility, and investments to demarcate routes and allocate dry season grazing rights in common-use rangelands.

This intervention sector around milk production centered on herd and natural resources management will go through a continuous learning journey with, as needed, adaptations made to increase sustained adoption of practices. Based on Phase I insights from the milk availability study and RD pilot, ongoing learning areas have been identified:

1. Three new lines of inquiry are emerging, that cut across the Governance and the milk availability work under Resilient Livelihoods; i) What limits sustained application of traditional resource management practices? ii) What are the traditional resilience capacities to drought and how widely are they still in use? iii) How do traditional resilience capacities align with those promoted by government and NGOs and, if divergent, can traditional approaches be adapted into the drought cycle management? To inform the program's drought response plan, consultations have been made by USAID Nawiri in both Samburu and Turkana counties about the resilience capacities to drought and current coping mechanisms pastoral and agro-pastoral communities adopt. Further investigations are however needed to continuously adapt the program's drought cycle management approach to the evolving context.
2. Establish a methodology for context monitoring integrating historical data (NDMA, SMART Surveys, etc.) and monitoring data. This will be critical for USAID Nawiri activities to identify trends and changes to trends between ecological health (water and rangelands), implementation of RD (agro-ecology) practices, herd management practices, social dynamics, milk production/consumption and human well-being indicators and to assess the program's impact over time.

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CONTACT:

Hussein Noor Abdille, Chief of Party
Email: habdille@mercycorps.org
Cellphone: +254 721 4975 43 | skype husseinnoor

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