JAMEEL OBSERVATORY
FOR FOOD SECURITY EARLY ACTION

Policy Brief

Earth observation forecasting: Can we prevent livestock feed crises?

Summary

Climate weather shocks, primarily droughts and floods, are a leading cause of livestock mortality,food insecurity, acute malnutrition, market instability, and chronic poverty in the drylands of East Africa.

Several early warning systems provide geographically disaggregated seasonal weather forecasts for the region, yet crises continue. A key reason is that these services provide information about expected weather conditions but not on the impacts they may have on people and livelihoods, nor how to respond to them.

Impact-based forecasts seek to close this gap by translating meteorological forecasts into practical information about likely impacts.

This brief shows how one such impact-based forecast – on livestock feed status – can enhance livestock productivity and food security in the drylands of East Africa. It explains what data and methods are needed, and how such a product could support local and strategic decision making in practice.

Key messages

- Drought-caused feed deficits reduce livestock health, productivity and value, and often lead to livestock mortality. These undermine livestock-led pastoralist livelihoods and household security.
- Seasonal forecasts describe expected weather conditions, but they do not inform pastoralists, policy makers or other decision-makers on the implications of expected conditions on livestock feed supply and demand. These information gaps delay action and cost lives and livelihoods.
- The data and methods now exist to build sub-national level forecasts of feed availability and demand, combining earth observation, livestock census data, and local knowledge.
- Impact-based feed forecasts scould shift responses from crisis management to pre-emptive action, enabling pastoralist communities and other agencies to arrange supplementary feeding before shortages become emergencies.

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Opportunities to act

- Co-produce feed-specific forecast products. National Meteorological and Hydrological Services (NMHSs) (e.g. Kenya Meteorological Department) and IGAD Climate Prediction and Applications Centre should work with livestock and rangeland specialists to translate seasonal forecasts into feed supply and demand projections at sub-national level.
- Invest in feed inventory and livestock data. Reliable, regularly updated data on feed availability, livestock numbers, species, and locations among other datasets is essential. This requires sustained public investment in both remote sensing infrastructure and ground-based scout networks.
- Pilot and learn. An impact-based feed forecast should be co-produced in selected areas (e.g. livestock production systems, counties, woredas), evaluated with pastoralist communities and response agencies, and iteratively improved and tailored to heterogeneous user needs before scaling.

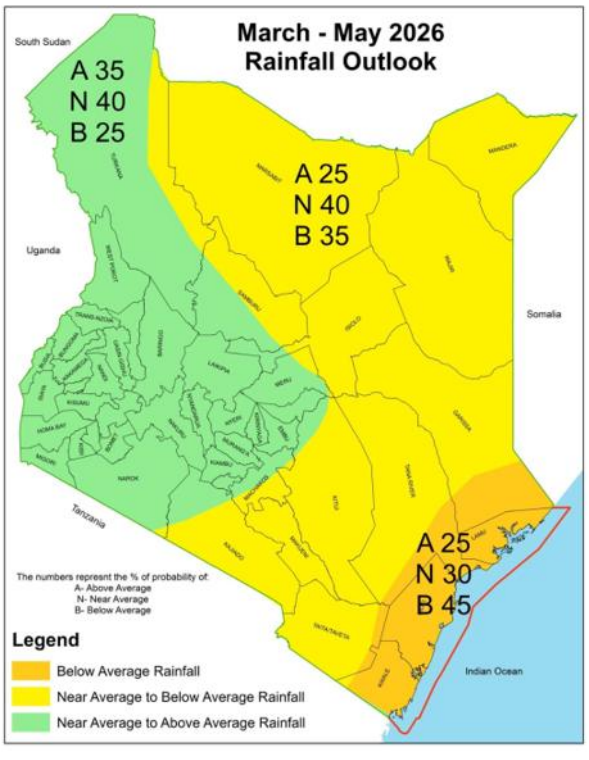
The problem: forecasts don't meet user needs

Across East Africa, early warning systems already exist. The Integrated Food Security Phase Classification provides a generalized assessment of food security conditions. Regional bodies like ICPAC produce seasonal meteorological forecasts, typically expressed as probabilities of above-normal, normal, or below-normal rainfall (Figure 1).

But neither product tells a county livestock officer, a feed supplier or a pastoralist how much and which types of forage will be available in the next season, whether it will meet local needs or what action should be taken in the near-term.

If weather forecasts were matched with data on future feed availability, at the right scale and in the right format, actions could be taken before a crisis rather than in response to one. An impact-based forecast for livestock feed security would bridge this gap.

Figure 1: Example seasonal forecast by the Kenya Meteorological Department



What is an impact-based forecast?

An impact-based forecast goes beyond predicting meteorological conditions. It provides detailed information about the potential consequences of those conditions for people, livelihoods, the environment and infrastructure.

In this scenario, by integrating seasonal rainfall forecasts with sub-national feed balance models, we can forecast where feed will be sufficient and where it will fall short and by how much.

To be effective, such impact-based forecasts need to share four characteristics (Table 1).

Table 1: Components of an impact-based feed security forecast

Characteristic	What it means for feed security	Example message or action
Prediction	Forecasts not only rainfall but likely feed supply and demand scenarios	Based on the March-May seasonal outlook, Turkana County is projected to produce 60% of its normal forage biomass
Risk	Considers exposure and vulnerability, since not all communities are equally affected by the same weather	Pastoral households in northern Turkana with small herd sizes and no alternative income face the highest risk of livestock mortality due to feed deficit
Actionable information	Recommends what to do, not just what to expect	Pre-position 5,000 tonnes of supplementary feed in Turkana by mid-April; open livestock movement corridors to Marsabit
Communication	Uses clear, direct messaging through channels that reach pastoralist and other communities	Sub-national level feed balance information shared via radio bulletins, extension officers, mobile platforms, and community networks

What information/data/methods are required?

To produce an impact-based forecast for livestock feed security, three types of information should be combined with the seasonal weather outlook:

Feed supply: Remotely sensed satellite imagery and ground data can be combined to estimate feed supply from natural grasses, crop residues, fodder crops and browse. Satellite products track biomass from all vegetation above ground, but some of this, while appearing to be green during droughts, may be unpalatable, giving false impressions of pasture availability. Further, not all green land is accessible for grazing. Therefore, satellite data must be linked with local knowledge and scout networks to validate forage maps. By combining vegetation status with seasonal rainfall forecasts and historical growth patterns, feed availability can be projected several months ahead.

Feed demand: This is calculated using livestock population, species, and location data. The challenge is that livestock numbers and locations are variable and often poorly documented, particularly in pastoral regions where populations are highly mobile. Moreover, since this data is typically only collected at long intervals, e.g. every 10 years, census and tracking systems are crucial.

Feed balance: The balance between supply and demand, computed at sub-national scales, reveals deficit and surplus areas and identifies where interventions should be targeted.

What could an impact-based forecast look like for the drylands?

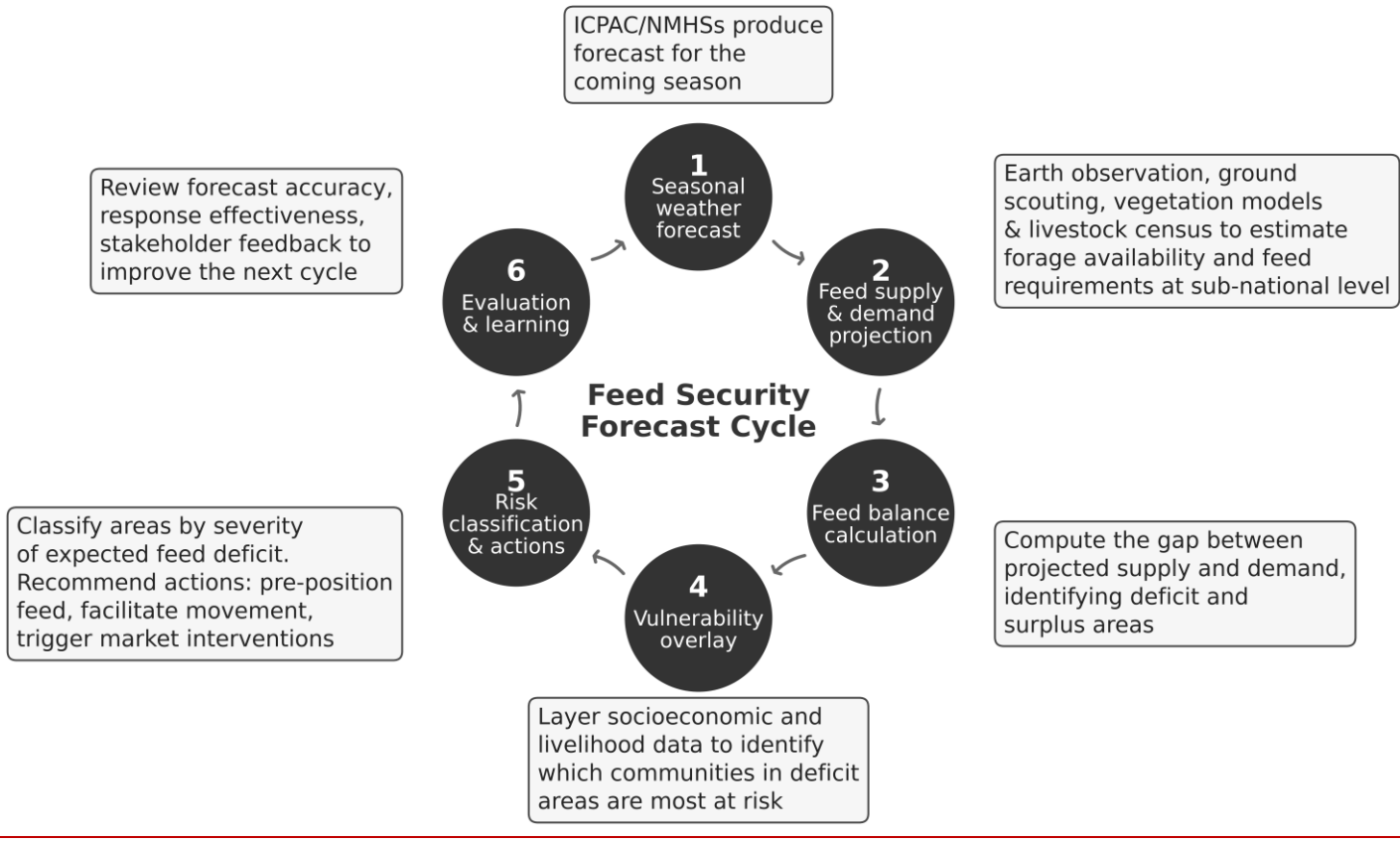
An impact-based forecast could be added to the National Climate Outlook and co-produced by NMHSs and other stakeholders. The starting point is engagement with decision-makers to understand what information they need and in what format. From there, a feed security forecast for the drylands could follow the pipeline shown in Figure 2.

The six-step process begins with the seasonal weather outlook and progresses through feed supply and demand projection, feed balance calculation, vulnerability assessment, and risk classification with recommended actions. A seasonal evaluation step closes each cycle, enabling actors to review forecast accuracy and response effectiveness before the next season begins.

It would be co-produced by national meteorological and hydrological service, livestock ministries, and local government officers, and communicated through channels that reach pastoralist communities and other users, not just technical reports but radio, mobile platforms, and community networks.

The data and methods to build such impact-based forecasts exist today. What is needed is the institutional commitment to bring them together into a single, operational product, one that tells people not just what the weather will do, but what it will mean for their animals, their pastures, and their livelihoods.

Figure 2: Feed security forecast cycle for the drylands.



More

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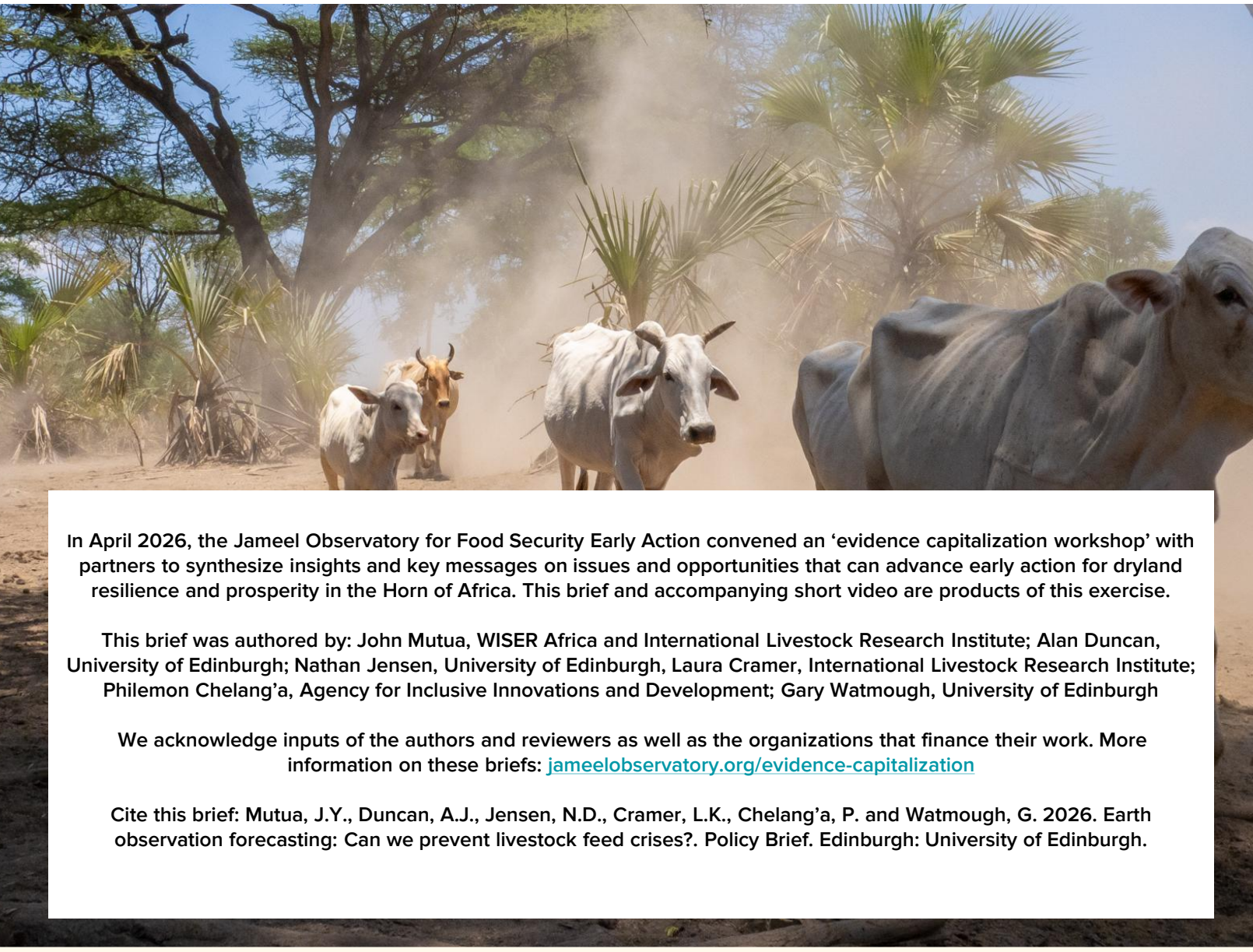

In April 2026, the Jameel Observatory for Food Security Early Action convened an 'evidence capitalization workshop' with partners to synthesize insights and key messages on issues and opportunities that can advance early action for dryland resilience and prosperity in the Horn of Africa. This brief and accompanying short video are products of this exercise.

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The Jameel Observatory for Food Security Early Action is an international partnership led by the University of Edinburgh collaborating with the International Livestock Research Institute (ILRI), Save the Children, the Abdul Latif Jameel Poverty Action Lab (J-PAL) and Community Jameel.

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