



Cattle keepers' preference for dairy business hub options in Tanzania

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Highlights

- Increasing demand for milk in Tanzania calls for new mechanisms to increase productivity and market orientation.
- Existing models may not be suitable and a tailored 'hub approach' is needed, the focus of this study.
- Choice experiment was conducted on 461 cattle-keeping households in Tanga and Morogoro regions.
- Findings show cattle keepers prefer hub arrangements with higher prices; bundled inputs and credit services; and credit or check-off as payment methods for bundled inputs and services.

Background

The Tanzania dairy value chain has been characterized by stagnation in dairy output and milk availability, leading to low milk consumption per capita (FAO 2012). Over the last two decades dairy output has grown by 4.4% per annum against a population growth of 4.5%, leading consumption to stagnate at 24kg per capita. Recently, however, demand has grown with milk consumption reaching about 39 litres per capita annually in the last decade (TNBS 2003).

The slow growth in productivity is largely driven by limited access to quality and affordable inputs and services, and output markets, among other factors (Swai and Karimuribo

2011; Ulicky et al. 2013). Improved organizational models are required to enhance access to inputs and services, increasing farm-level cow productivity and production. Yet, traditional approaches involving cooperatives are not sufficiently commercially orientated to ensure efficient linkages to input and output markets.

Working closely with development partners, the International Livestock Research Institute (ILRI) has developed an alternative approach to collective action, referred to as the dairy business hub (DBH). A DBH contractually binds dairy services to a milk buyer, enabling farmers to access milk markets, as well as inputs and services. The hub model is particularly useful in circumstances in which smallholder producers are scattered and produce low volumes, making it costly for traders/processors, as well as input and business service providers to provide services to farmers.

Successfully rolled out in Kenya, Uganda and Rwanda, ILRI is leading the implementation of adapted dairy business hubs in Tanzania. Success depends on the hub's adaption to the meet constraints faced by the respective smallholder dairy farmers. Current contracts imposed by milk processors, cooperatives or chilling plants may involve clauses, such as lagged payments (monthly or fortnightly) or other quality standards, unattractive to some farmers. Some farmers may also prefer a milk marketing arrangement, accompanied

by input and/or service provision to alleviate the onerous capital constraints. This study sought to determine the types of dairy business hubs smallholder dairy farmers in Tanzania would prefer and need.

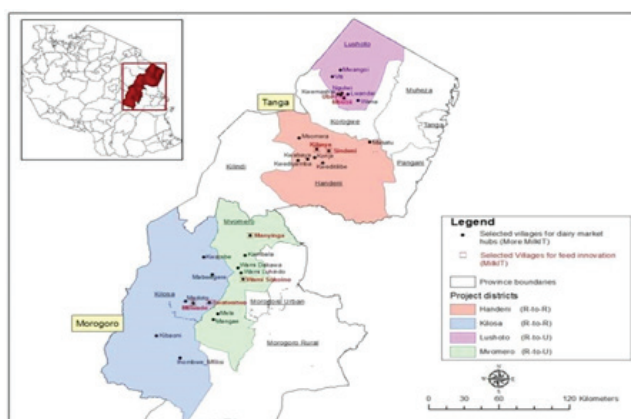
Study area and data collection

The data used in this study was collected from 461 cattle-keeping households from Lushoto and Handeni districts in Tanga region, and Mvomero and Kilosa districts in Morogoro region. Kilosa and Handeni districts are characterized by extensive, pre-commercial rural producers selling milk predominantly to rural consumers, while Mvomero and Lushoto were characterized by intensive commercially-oriented rural producers selling milk to urban consumers directly or via traders. Compared to hub approaches implemented elsewhere in East Africa, interventions in Tanzania targeted pre-commercial marginalized smallholder cattle keepers who had hardly participated in the dairy value chain.

The aim is to extend the benefits of commercial dairying; hence the DBH focus on small-scale milk traders, instead of larger bulking units. Households were sampled from project villages in proportion to the cattle-keeping population in each district. Project villages in each district were grouped by possible hub model—either a chilling plant-based hub or a milk trader-based hub, depending on pre-existing conditions for emergence of respective models.

A sampling frame was constructed for each hub type from a list of all cattle keepers in all the project villages. The household lists for each hub type was then divided into two: one list of group members and one for non-members of project groups. Finally, the required number of households was randomly selected from each list.

Figure 1. Study area



Source: Omoro (2012)

Data collection

A structured questionnaire was used to collect data on dairy productivity, animal husbandry, input access, milk marketing, and other socioeconomic variables. From the onset every household was presented with a set of 12 choice cards. Each card included a set of three alternatives, each had a mix of attributes defining a dairy business hub. The attributes included milk purchase price, frequency of

milk payments (cash, fortnightly, monthly), availability of bundled inputs or services, and mode of payment for the bundled inputs/services (cash, credit or check-off).

The selection of attributes was based on existing hub models, previously introduced in Kenya, Uganda and Rwanda. Respondents were requested to indicate on each card the most and least preferred alternative. The questionnaires were supplemented by key informant interviews with various actors in the dairy value chain and a review of relevant literature.

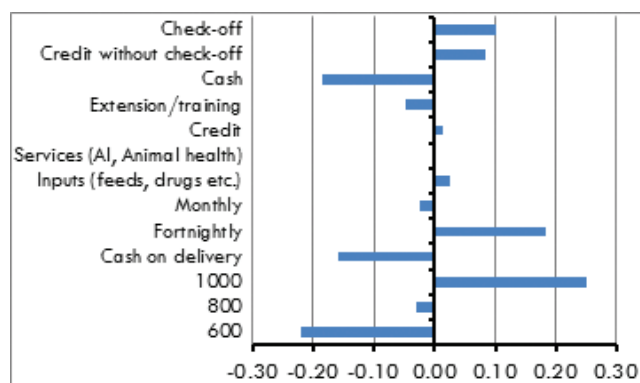
Figure 2. An example of a choice card presented to respondents in each household.

| Please indicate the most and least preferred milk sales and services provision arrangements (Tick only one case in each line) | | | |
|--|--------------------------|--------------------------|--------------------------|
| Attribute | Choice 1 | Choice 2 | Choice 3 |
| Milk price | 1000 TSH/L | 800 TSH/L | 600 TSH/L |
| Payment of milk | Fortnightly | Cash on delivery | Monthly |
| Input/service provision | Inputs | Services | Credit |
| Payment for inputs/services | Credit without check-off | Cash | Check-off |
| Most preferred | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Least preferred | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Findings and discussion

Figure 3 measures the association between attribute levels and preference for hub option. Positive scores indicate that higher preference for hub options is associated with respective attributes. As expected, the choice of hub options is positively associated with higher milk price attributes; the price of TZS 1000 per litre of milk received the highest score, while the other two lower prices were associated with lower preference for hub options.

Figure 3. Attributes' levels score



The Score is calculated as $M-L/(m \times n)$;

Where M is the number of times respective attribute appeared in hub options chosen as most preferred; N is the number of times the respective attribute appeared in hub options chosen as least preferred had the respective attribute level; m is the number of times the level was present in the choice cards for each respondent and; n is the number of respondents.

Fortnightly payment for milk was associated with a higher preference for hub choices than monthly or cash payments. With regards to bundling of inputs and output markets, bundling milk marketing with provision of inputs and credit appears to be associated with higher preference for hub options than the bundling of milk marketing with services and extension. Finally, payment for bundled inputs and services in credit or via check-off are also associated with increased preference for hub choices.

Determinants of milk producers' preference for hub attributes

Table 1 highlights which attributes determine preference for hub options. These findings confirm that smallholder dairy producer prefer milk marketing arrangements that offer higher prices, underlining the need to establish efficient market linkages ensuring farmers receive higher milk prices. With regards to mode of payment for milk, farmers prefer delayed payment, but not too infrequently, every two weeks. Their preference for delayed payment may be due to the need to accumulate funds for substantial investments, otherwise a challenge if paid on a daily basis.

Table 1. Determinants of preference for hub attributes

| Variables | Mean effects | | Variance | |
|---------------------------------------|-----------------------|-------|-----------------------|-------|
| | Coefficient | SE | Coefficient | SE |
| Price of milk/litre (TZS) | 0.003 ^{***} | 0.000 | 0.003 ^{***} | 0.000 |
| Fortnightly ^a | 0.531 ^{***} | 0.053 | -0.812 ^{***} | 0.060 |
| Monthly ^a | 0.051 | 0.062 | 1.049 ^{***} | 0.068 |
| Services ^b | -0.142 ^{***} | 0.049 | 0.064 | 0.094 |
| Credit ^b | -0.042 | 0.051 | -0.240 ^{***} | 0.086 |
| Extension ^b | -0.178 ^{***} | 0.049 | 0.075 | 0.092 |
| Credit without check-off ^c | 0.322 ^{***} | 0.044 | 0.264 ^{***} | 0.076 |
| Check-off ^c | 0.403 ^{***} | 0.057 | 0.984 ^{***} | 0.061 |
| Observations | 16,596 | | | |
| Log likelihood | -5144 | | | |

^{***}, ^{**}, ^{*} implies variable is significant at the 10%, 5%, and 1% level, respectively.

^aThe reference frequency of payment for milk is cash on delivery.

^bThe reference service is input provision.

^cThe reference mode of payment for services and/inputs is cash on purchase.

As previously discussed, the hub approach is promoted as a mechanism for improving farmer access to inputs and services. By tying inputs and services provision to milk marketing, DBH ensure farmer access to inputs and services in return for milk delivered, regardless of their cash flow availability. Farmers prefer milk marketing services bundled with input provision, rather than extension. This could be an indication of limitations that farmers face in accessing inputs relative to accessing extension or other services. Moreover, farmers prefer payment via either credit or check-off. This flexibility offering farmers access inputs and services on check-off is a defining characteristic of the hub model.

These findings imply homogeneity among the sample respondents. Yet, the last two columns of Table 2 shows the effect of the variance of the mean of respective attributes on farmer preference for hub options, revealing significant heterogeneity, at least for one level for each attribute. This confirms existence of individual heterogeneity among respondents that we will consider using more advanced models in future analyses.

Valuation of hub attributes by cattle keepers

In addition, the study looked at how much money respondents were willing to pay/forego in return for hubs with respective characteristics (see Table 2). Findings indicate respondents would be willing to forego TZS 194/

litre of milk sold in exchange for hubs which pay on a fortnightly basis—only TZS 19 for those paying monthly—rather than in cash. For milk marketing arrangements paying on a monthly basis, respondents would be willing to forego approximately TZS 176/litre of milk to switch to a fortnightly payment regime.

Table 2. Willingness to pay estimates

| Attribute levels | TZS/litre of milk | 95% confidence interval |
|---|------------------------|-------------------------|
| Fortnightly payment for milk | -194.17 ^{***} | -237.83, -150.51 |
| Monthly payment for milk | -18.75 | -63.47, 25.97 |
| Bundled service provision | 51.94 ^{**} | 16.24, 87.63 |
| Bundled extension services | 64.87 ^{***} | 28.87, 100.87 |
| Bundled credit services | 15.19 | -21.46, 51.85 |
| Payment for services/inputs via credit | -117.64 ^{***} | -152.90, -82.38 |
| Payment for services/inputs via check-off | -147.44 ^{***} | -192.04, -102.83 |

While respondents would be willing to forego TZS 52/litre of milk in exchange for market coordinating mechanisms bundling supply of inputs (feeds drugs etc.), rather services (animal health, breeding etc.) with milk marketing, they would be prepared to relinquish even more (TZS 65/litre of milk) in exchange mechanisms bundling inputs supply rather than extension services.

Coordinating mechanisms bundling inputs and services were the most in demand, with respondents willing to forego TZS 118/litre of milk to ensure payment for these goods on credit. Similarly, respondents would be willing to forego TZS 147 in exchange for bundled goods and services via check-off. However, respondents would be willing to part with much less (TZS 29/litre of milk) to switch from credit payment to check-off system.

Conclusions

This study sought to understand preferences among dairy farmers for attributes of dairy business hubs, currently offered by ILRI and its partners, facilitating the on-going adaptation of the hubs to the Tanzania dairy value chain. As expected, higher price remains the main priority of smallholder dairy farming households. Second, smallholder producers prefer bulk to cash payment for milk on fortnightly, rather than monthly basis. Preference for bulk payment may be driven by the desire to accumulate funds for substantial investment, indicating that dairy farming is an economic rather than a subsistence enterprise for smallholders.

Third, smallholder dairy producers prefer hub arrangements bundling milk markets with inputs and/or services provision. Arrangements bundling input provision was preferred to those bundling services, such as animal health or extension, perhaps pointing to obstacles facing households accessing inputs. While the delivery of services, such as animal health or extension, remain the domain of the public sector, input provision is largely private with businesses located centrally far from most farms. Thus producers would be looking for arrangements to alleviate the challenges they face in accessing inputs.

Finally, probably due to liquidity constraints, respondents preferred payments options for bundled inputs and/or services which did not involve cash. While checkoff options were preferred, producers seemed to accept credit as well as a possible mode of payment. However, significant heterogeneity among respondents was found, indicating these conclusions may not apply across board. Further analyses accounting for such heterogeneity will be needed to offer recommendations facilitating more targeted hub adaptation to the Tanzania dairy value chain.

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