

Feed efficiency of dairy cattle in an urbanizing environment: Insights from Bangalore, India

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Introduction

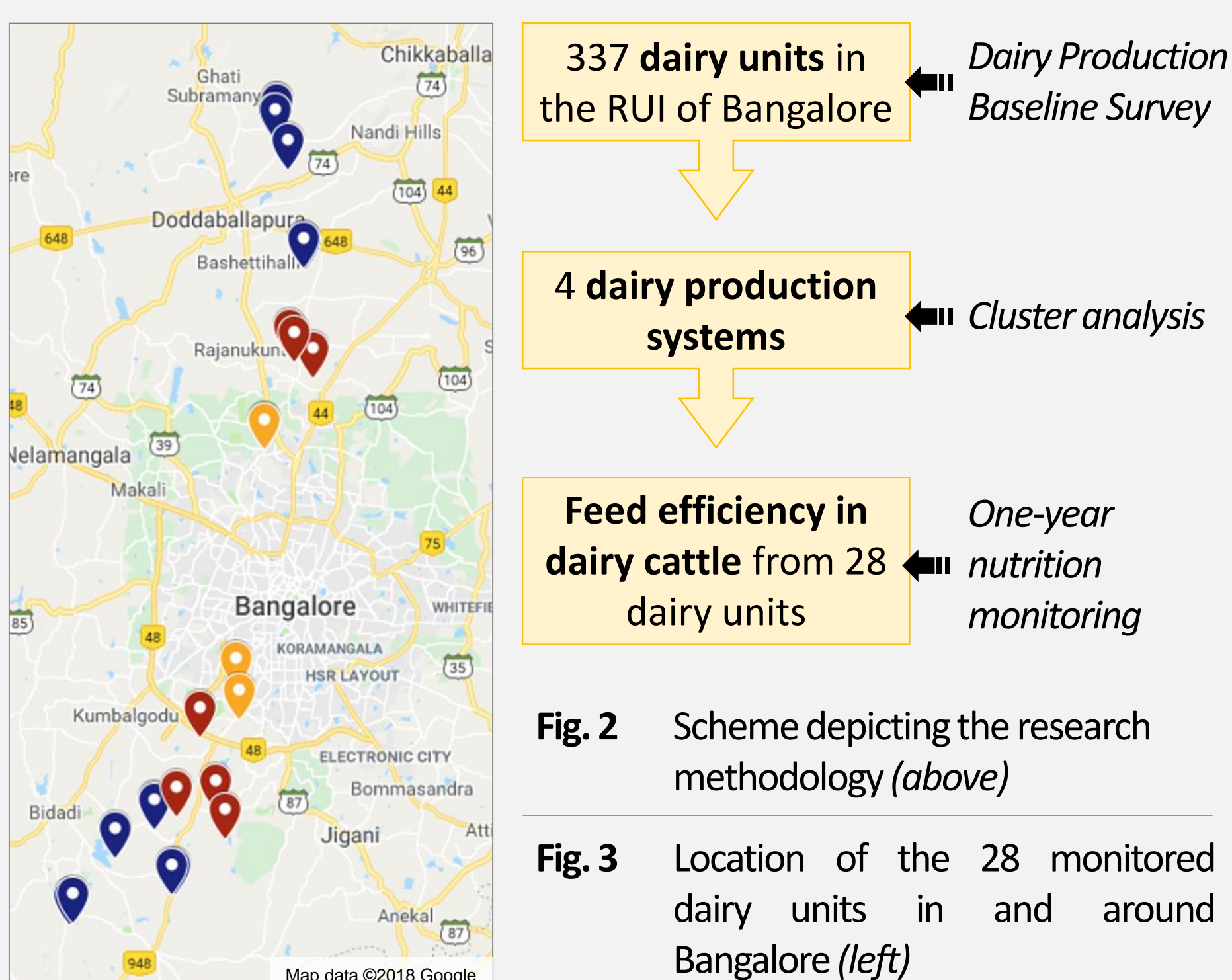
Urbanization of our environment is an indisputable feature of the 21st century, pushing agroecosystems towards intensification and/or more efficient resources use.

The emerging megacity of Bangalore, India, combines rapid urbanisation with a high demand for dairy products. Interestingly, dairy cattle are an integral part of its urban landscape (Fig. 1).

Aim of the study

To quantify feed efficiency in dairy cattle for four different dairy production systems existing in the urbanizing Rural-Urban Interface (RUI) of Bangalore

Methodology



- Characterization of dairy production systems in the RUI of Bangalore through cluster analysis of 337 surveyed dairy units (Fig. 2).
- Selection of seven dairy units per dairy production system for one-year nutrition monitoring (Fig. 2 & 3).
- Eight visits per dairy unit over one year to quantify feed intake and daily milk offtake for individual dairy cows, plus qualitative sampling of feedstuffs and milk.



Fig. 1 How do an urbanizing environment and a high demand for milk affect feed efficiency in dairy production in the Rural-Urban Interface of Bangalore?

Highlights

Although urbanization enhances land competition, high demand for milk motivates urban dairy farmers to continue production by relying on public green space and market waste for feedstuffs.

Using energy supply level as proxy for feeding efficiency indicates that dairy producers relying on self-cultivated forages (Clus-4) oversupply their cows while those relying on pasture plus external feed sources tend to severely undersupply them (Clus-2).



Fig. 4 A young heifer in front of stack of dry forage. During dry season, dairy producers in areas with water shortage might rely entirely on dry forage for homestead feeding.



Fig. 5 A cow let to pasture in a green urban public area

Results

Feeding practices

Common self-cultivated forages were Napier grass, maize and finger millet straw (Fig. 4).

Additionally, rural dairy producers fed natural grasses or crop residues; in urban areas, market waste (fruits, vegetables) was fed.

All producers fed concentrates two times per day.

Clus-4 producers exclusively relied on self-cultivated forage, Clus-1 and Clus-3 farmers additionally relied on pasture (Fig 5).

Clus-2 producers sent their cattle to pasture but did not cultivate forage (Tab 1).

Tab. 1 Average daily intake of feed dry matter (DM), crude protein (CP) and metabolizable energy (ME) per cow and production system. Values are expressed per unit of metabolic body weight (MW).

	DM (g/kg MW)	Pasture share (%)	CP (g/kg MW)	ME (kJ/kg MW)
Clus-1	114 ^a	25	14 ^a	1273 ^a
Clus-2	94 ^b	28	12 ^b	1067 ^b
Clus-3	132 ^c	14	14 ^a	1295 ^a
Clus-4	165 ^d	2	17 ^c	1504 ^c

Different letters indicate significant differences between groups ($p < 0.05$)

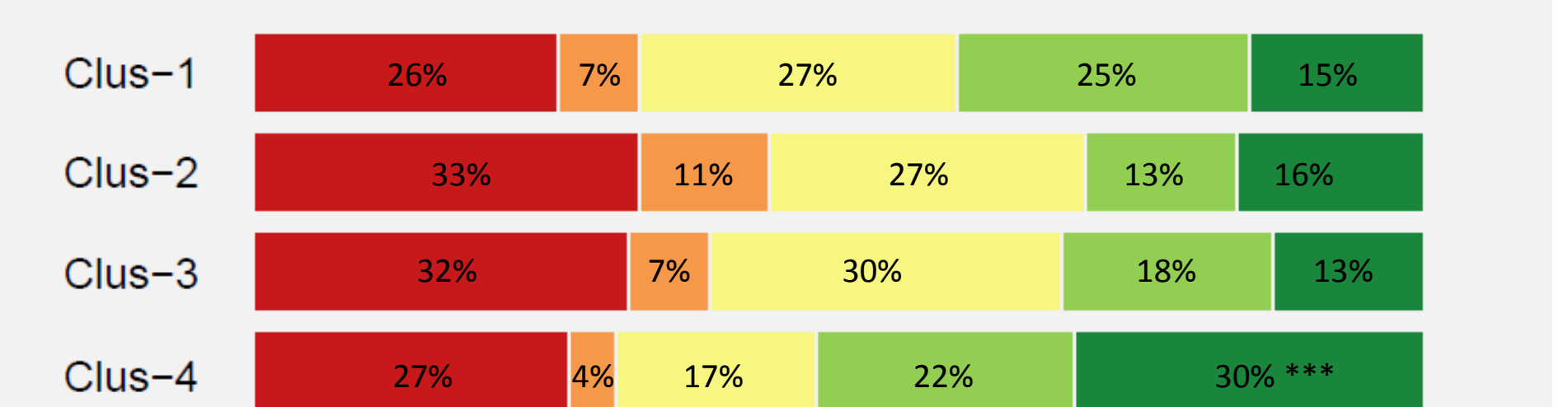


Fig. 6. Proportion of cows per energy supply level (ratio between individual intake and requirement of metabolizable energy (ME)) for the four dairy production systems.

Energy supply level

Daily feed intake was highest in zero-grazing cows and lowest in dairy units without own forage production (Tab 1).

Individual supply with metabolizable energy (ME) reflects these trends; inefficient ME under- and oversupply of cows occurred in each system (Fig. 6).

In the RUI of Bangalore, combined reliance on self-cultivated forages and pasture seems most viable in term of resources allocation and feed efficiency.



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