

M.S. Alam¹, S.M. Velayudhan², A. Mech³, R. Rößler¹, P.K. Malik³, R. Bhatta³, S. König² & E. Schlecht¹

¹ Animal Husbandry in the Tropics and Subtropics, University of Kassel & Georg-August-University Göttingen, Germany

² Animal Breeding & Genetics, Justus Liebig University Gießen, Germany

³ National Institute of Animal Nutrition and Physiology, Bangalore, India

Background

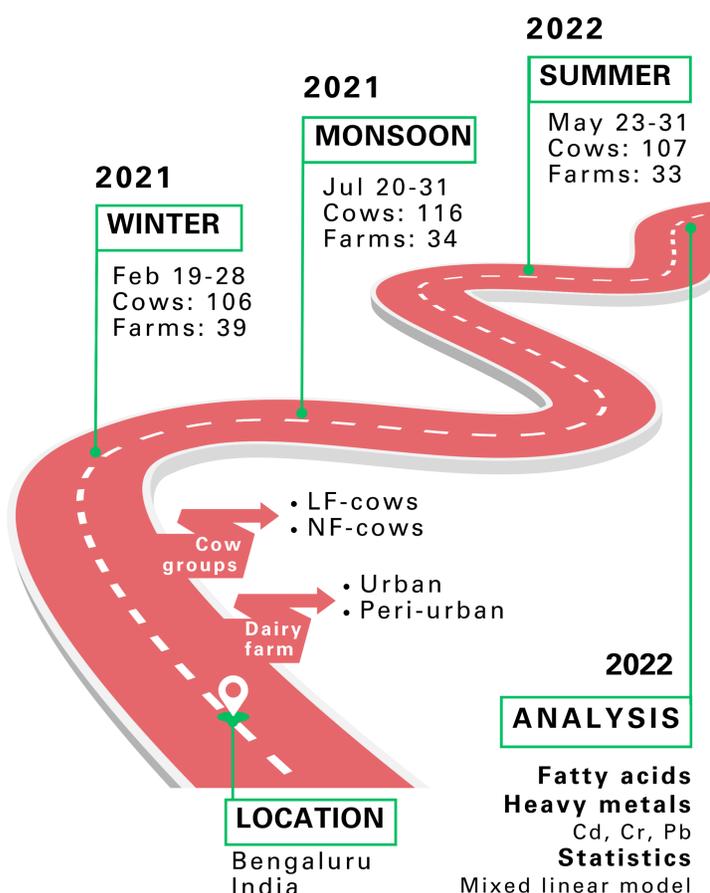
Complex urbanization dynamics in India negatively impact feed production for livestock kept in the vicinity of cities. This compels farmers to integrate alternative feed sources like lakeshore grass (Fig. 1) into their dairy cows' diets. These adaptations, however, may alter milk fatty acid profile and introduce heavy metals.



Fig. 1 Cows grazing near a lake in Bengaluru, India

Aim: Asses the impact of using lake fodder (LF) or not (NF) on cow milk fatty acid profile and heavy metal content, along with the impacts of location (urban vs peri-urban) and season (winter, monsoon, summer).

Methodology



Results

Urban cows' diets have a 29% higher roughage-to-concentrate ratio than peri-urban diets ($P < 0.05$) due to a 32% share of lake fodder (Fig. 2). A higher share of roughage can lead to higher amounts of unsaturated fatty acids in milk.

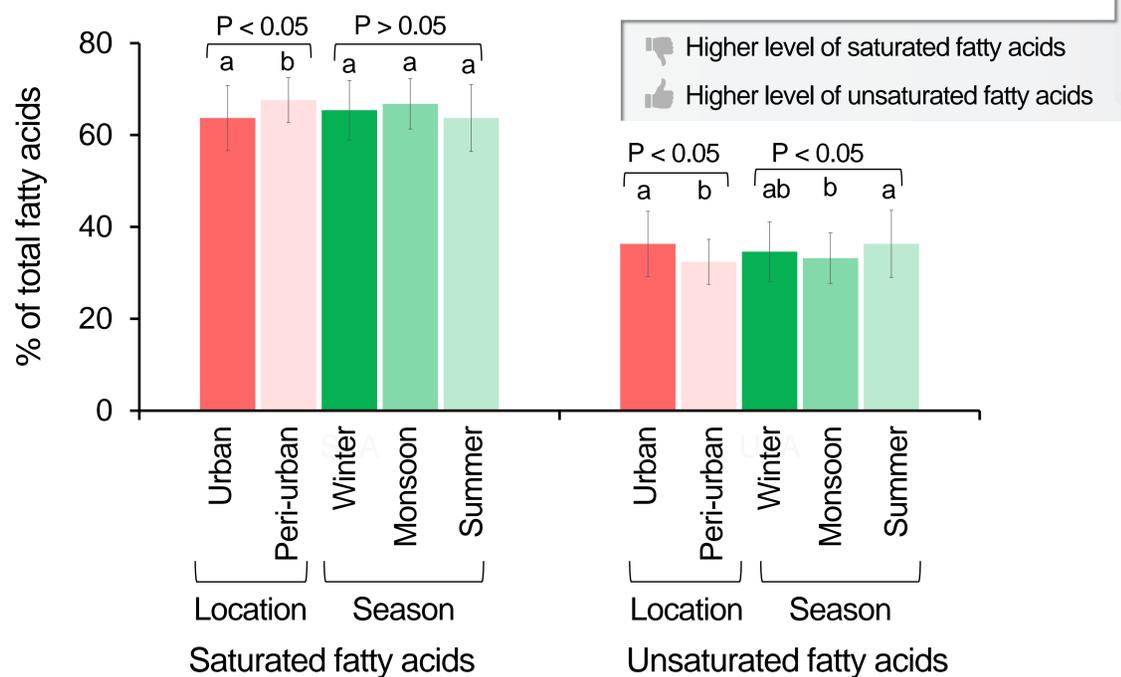


Fig.2 Effect of location and season on saturated and unsaturated fatty acids.

Cadmium (Cd), chromium (Cr), and lead (Pb) intake through feed was higher in summer than in monsoon and winter ($P < 0.05$), due to elevated concentrations in the feed (Table 1). Cd was absent in milk, while Cr and Pb were detected. Winter milk exceeded safe human consumption levels for Pb.

Table 1. Effect of season and feed origin on Cd, Cr and Pb content in milk.

Variable	n	Heavy metals in milk (mg/kg)		
		Cd	Cr	Pb
Cow group				
NF - cows	183	0	0.015	0.017
LF - cows	146	0	0.013	0.012
SEM	-	0	0.002	0.005
Season				
Monsoon	116	0	0.020 ^b	0.006 ^{ab}
Winter	106	0	0.009 ^a	0.036 ^b
Summer	107	0	0.012 ^a	0.002 ^a
SEM	-	0	0.002	0.006
Permissible limit*		0.01	-	0.02

^{a-b}Mean values with different superscript in the same column differ at $P < 0.05$.
 NF: Non-lake feed, LF: Lake fodder *FAO/WHO, 2021

Highlights

Although the land for fodder cultivation or grazing is limited, urban cows produce high quality milk with alternative feeds. Despite seasonally high heavy metal intake, cow milk is safe for human consumption. Yet, it's crucial to assess the chronic effects of heavy metal intake on cows' health.



Contact
 Shahin Alam
 shahindps@uni-kassel.de
 FOR2432/2 - Project A03