Milk Production Losses due to Climatic Change in North-Indian Plains

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Introduction

Heat stress causes productivity losses in dairy animals. In small-holder dairy production systems as in India, where knowledge and resources to mitigate these losses are limited, rising temperature due to climatic change would inflict heavy economic losses.

Aim

Magnitude of potential economic loss being an important consideration for allocation of adaptation investment, its estimation was carried out in North-Indian Plains, located in highly climate changesusceptible region of sub-tropics and producing about 50 million tonnes of milk annually.

Methods

Climate sensitivity of three types of dairy animals in the region, crossbred, indigenous cattle and buffalo was assessed using panel data for the period 2001-10, regressing fortnightly milk productivity on animal characteristics and temperature and deriving the marginal effect of temperature change on productivity. Representative Concentration Pathway 4.5 climate scenario for the period 2010-39 was downscaled at a spatial resolution of 0.5×0.5 degree for temperature projections. The losses in milk production were then worked out for the time slice 2010-39 and two sub-slices, 2020-29, 2030-39 under the BAU and alternate scenarios of population and productivity growth of animals in the region.

Results

Mean temperature in the hot-humid season will rise by about 1℃ in the region. Fortnightly rate of milk productivity decline ranges from 0.5-1.2 percent per unit increase in maximum temperature. Annual loss in milk production due to rise in temperatureduring time slice 2010-39 is projected torange from 361-377 thousand tons under different scenarios, valued at INR 11.93-INR 12.44 billion at current milk prices. The losses would escalate in 2030-39 compared to 2020-29.

Conclusion

Without adaptation measures, climatic change would hamper the realisation of yield enhancing benefits of technological and genetic improvement in dairy animals. Adaptation fund amounting to potential monetary losses can be created for supporting the farmers.