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Title: Sustainable Energy Use in Agricultural Value Chains



The sustainability of modern economic growth is in large part dependent on economizing scarce energy resources. Although traditional value chains are typically thought to use minimal energy, their low productivity makes it difficult to achieve farm diversification and income growth. The move towards modern value chains could, however, makes them vulnerable to energy costs. It is against this background that this study examines energy use in food value (or supply) chains in India. This paper summarizes the results from stacked surveys of stakeholders (farmers, rural intermediaries, wholesalers, processors, commission agents, retailers) in the potato and dairy value chain conducted in 2015. These value chains were directed towards supplying the large urban market of Delhi. Cold storages constitute the 'modern' element in the potato value chain. They are widely available but have not replaced the traditional marketing agents. Dairy, on the other hand, is marked by a clear contrast between traditional and modern value chains. Modern value chains involve preservation, processing and are geographically long. Despite such substantial differences, the surprising finding is that, on-farm energy costs are the most important component of the energy use in the value chain for both of these commodities. On-farm energy costs comprise directly consumed energy (e.g., diesel and electricity use) as well as energy indirectly consumed (e.g., fertilizers). In the case of dairy, the relatively lower energy consumption down the value chain is primarily because of the limited penetration of the organized dairy sector. The case of potato, however, represents successful commercialization in small-holder agriculture. The indirect on-farm energy costs embedded in fertilizers and machinery rentals are substantial. The relatively lower energy consumption of the processing sector occurs despite widespread use of cold storage. These unexpected findings suggest (i) on-farm energy use is important to consider (ii) on-farm energy use could be important in disparate circumstances – when coverage of modern value chains are limited (milk) and when energy intensive processing is widely prevalent (cold storage of potato) and (c) most importantly that, on-farm energy intensity could be strongly correlated with the transformation of the value chain itself.