

Livestock Operations in Small-Scale Dairy and the Uses of Pre-Identified Production Clusters in South Africa

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ABOUT THE STUDY

Around half of all livestock operations in Africa are run by smallholder dairy farmers, yet they struggle to produce additional milk due to a lack of infrastructure and a framework that would allow them to do so. In this case, smallholder dairy farmers employ a range of strategies to increase milk production. However, the attempts require a lot of time, money, and heuristics. A shortage of extension officers also causes smallholder dairy farmers to get stuck in cycles of failure, make futile attempts, and lose enthusiasm to keep farming. As a result, the treatments were simpler because smallholder dairy producers with similar features grouped together. The goal of this project was to develop a rule-based engine that would automatically group smallholder dairy producers into certain clusters. A total of 78 stakeholders were questioned, including 9 Tanzanian extension officers from Meru-Arusha and 69 smallholder dairy farmers. The previous study's 10 production features and 6 specified clusters were used in this one. The chosen 10 production features were therefore used by a rule-based engine. The rule-based engine consequently automatically places the smallholder dairy producers in the appropriate clusters. Because of this, smallholder dairy farmers collaborate to boost milk production through these clusters. Additionally, smallholder dairy farmers in the system receive prompt assistance from extension officers with their farming issues.

Smallholder dairy farming initiatives are a vital source of daily sustenance for the majority of farmers who are actively engaged in farming. Smallholder farmers in Africa produce close to half of the continent's total livestock output. By raising income through the sale of dairy products and enhancing nutrition through milk consumption, the dairy industry has a considerably greater potential to enhance livelihoods. Small-scale dairy farmers struggle to produce enough milk to sell while still providing for their families. In order to make sure that they can readily access the services they need to maximize their production, the proper framework and substructure must be implemented.

These Tanzanian farmers often have small farms (less than 2 hectares) and herds of cattle with 1 to 5 cows. They also have low market preferences. Smallholder dairy farming initiatives are a vital source of daily sustenance for the majority of farmers who are actively engaged in farming. Smallholder farmers in Africa produce close to half of the continent's total livestock output. By raising income through the sale of dairy products and enhancing nutrition through milk consumption, the dairy industry has a considerably greater potential to enhance livelihoods. Small-scale dairy farmers struggle to produce enough milk to sell while still providing for their families. In order to make sure that they can readily access the services they need to maximize their production, the proper framework and substructure must be implemented. These Tanzanian farmers often have small farms (less than 2 hectares) and herds of cattle with 1 to 5 cows. They also have low market preferences [1,2].

Low output and commercialization are caused by ineffective breeding techniques, feeding regimes, and infrastructures in the dairy farming industry. A recent thorough assessment found that certain farmers produce much more than the average for the country Program for Emerging Agricultural Research Leaders (PEARL). According to reports, the farmers' production standpoint in terms of marketing and yielding has been taken away from them because they are unaware of the production system they use. Practically, because of key characteristics of farmers based on management practices, heterogeneous groups make it more difficult to provide services, share knowledge, and distribute technology, especially for those who seek to maximize productivity and profitability. It is necessary to identify homogenous groupings among dairy producers (clusters that participate in comparable managerial activities) for easier intervention. It is generally known that smallholder dairying in homogenous groupings, where farms are categorized, has particular constraints that are present in different farm types. Using technologies like cell phones, if properly planned, extension services (such as cattle healthcare, breeding technology, feeding technology, and other dairy farming services)

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improve the quality and speed of reaching smallholder dairy producers.

There are significant similarities among smallholder dairy producers throughout Sub-Saharan Africa (SSA), regardless of region. However, disaggregation is required due to characteristics that are important to farmer management strategies. As a result, establishing specific limitations for each farm classification, improving farm management methods, and utilizing extension services can all be beneficial. Together, small-scale dairy producers gain new skills and improve their ability to deal with challenges. For farmers to achieve the desired results, collective action is required. Smallholder dairy producers should be educated by extension agents how to boost the quality and quantity of their output in order to increase yields. Unfortunately, it appears that farmer groups are not very active and place little focus on this. Electronic tools, especially mobile phones, disseminate information such as feeds, breeding, and health services, which dairy producers frequently require. Lack of access to information and knowledge transmission can hinder agricultural progress in rural farming communities in sub-Saharan Africa [3].

By connecting smallholder dairy producers, enabling access to extension services, and spreading awareness, mobile phones take communication to a new level. Cell phones are regarded as a practical, efficient, and appropriate form of communication by farmers as well. Numerous studies have demonstrated the value of social networks, particularly peer-to-peer contact within farmer organizations, for farmer learning. Several social media platforms are used by different industries to encourage economic and industrial growth. Social media platforms are used by those working in the agriculture sector to exchange knowledge and important details pertaining to the activity. Social media users can create groups based on their activities; for instance, smallholder dairy farmers can create a group on any social media platform and share expertise and important data about dairy farming.

People share information, expertise, and experiences on social media sites like WhatsApp, Facebook, Twitter, Clubhouse, LinkedIn, and Instagram as well as express themselves on these sites [4].

CONCLUSION

The main goal of this project was to develop a rule-based engine that would automatically group smallholder dairy producers into

predetermined production clusters based on the performance of their milk output. Giving smallholder dairy farmers access to their respective established production clusters served the purpose of assembling smallholder dairy producers with similar characteristics in order to share information and experience regarding farming issues, with the main objective of boosting milk yield. The results of this study show that smallholder dairy producers were automatically assigned to the appropriate clusters by the rule-based engine. As a result, smallholder dairy farmers in these clusters communicate with extension agents, share their knowledge of agriculture, and get timely help based on their needs for dairy production.

And let's say a smallholder dairy farmer satisfies the performance standards based on the milk output of another cluster. That smallholder dairy producer is then automatically moved to that cluster by the rule-based engine. The system's extension officers' upgrades and features for cluster production allowed smallholder dairy producers to self-evaluate by adopting agricultural practices from their peers. A graph of milk yields shown on smallholder dairy producers' dashboards allows them to keep track of the performance of their daily milk yields.

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