DSS for milk quality

Problems:

The production of ewe's milk and its quality in the Tuscany region (Italy) have decreased in the last few years. This was also due to the lack of efficient systems to transfer innovations aimed at improving the efficiency of dairy sheep farms. Indeed, the dairy sheep farm sector is characterized by a lack of professionists supporting farmers and by a low adoption of technological innovation. In particular, the innovations already tested by academics are hardly transferred to the farmers.

Moreover, generally farmers are not using digital tools that may help them in efficiently registering, monitoring and keeping track of milk quality and productivity, allowing them to promptly recognize problems, such as drops in the values, and adopt corrective actions when needed (e.g., changes in the diet).

Solutions:

An application for smartphones was developed within the project Precision Sheep to support the increase of the efficiency of dairy sheep farms for the Pecorino Toscano DOP cheese production. The mobile app facilitates the communication between academics and producers by transferring the best management practices based on the principles of precision-farming and precision-feeding.

The application includes two Decision Support Systems (DSSs), one for flock fertility and register and the other one for milk quality, to support dairy sheep farmers in monitoring milk production and flock fertility and providing advicises to improve their competitiveness.

The DSS focused on milk quality (i) receives the results of the periodic analysis of milk parameters carried out by cheese factories and the amount of milk delivered, (ii) analyzes and shows them in a dashboard.

In particular, four panels shows synthetic evaluations and indices on the most recent data on milk quality and productivity:

1) flock's health: based on somatic cells and bacterial load. The legal limit (Reg. 853/2004) of the bacterial load is 500000 ufc/ml for production based on raw milk and 1500000 ufc/ml for other productions;

2) flock's nitrogen nutrition: evaluated on the concentration of urea in milk (recommended values are between 30 and 50 mg/dl);
3) milk's quality: based on the amount of fats and proteins in milk (fats percentage between 6-8% and proteins between 5.5-6.5% in ewe's milk);
4) productivity: showing the average monthly productivity per head and the productivity normalized according to the formula FPCM(6.5; 5.8) = L(0.25 + 0.085F + 0.035P) where L is milk yield, F is the percentage of fat and P is the percentage of proteins.

By clicking on each panel the user can visualize details, such as the comparison with the value of the same month in the previous year and the benchmarking with the average of the value among the farmers in the same cooperative, both focusing on the current month (as table) and also on the long-term data (both as table and as plot).

Practical recommendations:

- the efficiency of data transfer from cheese factory to the app should be improved by adopting standards (e.g., in the formats and in the parameters to be showed to the farmers);
- users can enter specific data on their farm to keep the advice more focused on their specific situation.