Digital Transformation Monitor

Connected livestock

October 2017
Livestock farming is a vital part of the economy in many countries and its importance is likely to remain, as food needs will skyrocket with the growth of the world population. In order to improve profitability and efficiency, connected solutions for livestock are starting to hit the market. Nonetheless, some important challenges remain before widespread adoption.

New stakes for the livestock industry

Food output will have to increase in the coming years

According to the United Nation\(^1\), the current world population stands at 7.6 billion people. This figure, as well as food needs, will keep increasing at a fast rate, with 8.6 billion people in 2030, 9.8 billion in 2050 and more than 11 million in 2100.

Demand for milk and dairy products increasing

In addition to an ever-increasing population, per capita consumption of dairy products keeps growing, from 101.5 kilograms in 2005 to 111.3 kilograms in 2015\(^2\).

Solving the stakes of an increasing demand

To meet the future food needs, ensuring the productivity and profitability of existing farms is key.

Currently, important differences in productivity exist between producers around the globe. For instance, while dairy cattle in Pakistan produces an average of only 5 liters per day per cow, most productive cows generate up to 30 liters per day\(^3\).

Thus, the best solution is not an increase in the number of animals, but in the improvement of their health and productivity.

In Europe, the number of livestock unit (LSU), a reference unit to facilitate the aggregation of livestock from various species and age, has been decreasing for several years\(^4\). Cattle, which compose the majority of livestock in European farms, is also decreasing slowly: from 92 million head of cattle in 2005 to 88 million in 2013.

To help farmers face these challenges, connected solutions for their livestock may soon play a more important role.
Connected livestock solutions

Like in many other verticals, IoT solutions are starting to spread in the agriculture and dairy farming industry. Connected solutions for agriculture, also called “agritech”, are starting to hit the market and mainly aim at monitoring the health of livestock and/or improving profitability of farms by increasing productivity.

The vast majority of connected livestock solutions are developed for cattle (domesticated bovines), especially cows. This can be explained by the value of such animals, compared to smaller livestock such as chicken or pigs. Outfitting every small animal in the farm would mean very high capital expenditure costs for the owner.

In addition, these animals generally require far less oversight, health-related in particular.

Connected objects for livestock are improving

For humans as well as livestock, significant progress is being made in the connected objects segments. Miniaturisation of components, progresses in battery technology, network improvements have continuously improved in recent years. These smaller, cheaper and more accurate devices are being developed and sold, which could ease deployment. In addition, smaller animals could potentially be outfitted with such devices in the future, if manufacturers manage to develop applications/services interesting for owners.

Multiple technologies can be used to provide connectivity

To connect the animals with the farm owner, device makers use different technologies, depending in part on the type of applications: cellular networks, satellite, RFID, VHF, LPWA... As of 2017, no specific technology seems to have an edge in the connected livestock solutions market.

In any case, the volume of data remains significant, especially if many animals are connected: a cow can generate approximately 200 megabytes of data per year, according to CowManager, a Dutch device maker.

Health

One of the most obvious benefit and selling point of many connected livestock solutions is the possibility of health monitoring.

Farmers currently have to spend a lot of time to monitor their animals’ health by traditional means. However, symptoms can easily remain undetected, for several days at times.

Selling prices of animal products in France

(per 100 kg live weight)

<table>
<thead>
<tr>
<th>Product</th>
<th>Price (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young cattle</td>
<td>337.90</td>
</tr>
<tr>
<td>Pigs</td>
<td>121.50</td>
</tr>
<tr>
<td>Chickens</td>
<td>176.40</td>
</tr>
</tbody>
</table>

(Source: Eurostat Data, 2015)
By using connected devices, farmers aim to reduce drastically this period, and thus, treat and/or isolate the animal quicker. For instance, connected tags put on an animal’s ear, like the solution from Quantified AG, can gather and transmit biometric and behavioural data that can notify farmers almost in real time if symptoms are detected.

**Fertility/calving**

In order to produce the maximum amount of milk, dairy cows must constantly be in a cycle of getting pregnant and giving birth. Missing a cycle translates to lost sales equivalent to EUR 230 per cycle.4

As a result, insemination operations are of paramount importance for farmers. Dairy cows only have a short window for insemination: a cow goes into heat for a period as little as eight hours per month. Besides, since cows are overwhelmingly inseminated artificially, each failure has a heavy cost for the owner.

Currently, farmers must monitor livestock themselves, in order to detect the right signs. Connected solutions for these applications aim at using sensors to accurately detect signs of heat and notify farmers by message, even if it occurs in the middle of the night.

For instance, Heatime’s solution uses necklace tags with motion sensors and microphones to monitor cows. Activity and rumination are measured, to alert notify farmers in case of heat or health problem.

These solutions may contribute to reduce calf mortality: around 2.9% of calves are born dead and 3.5% are born alive, but die of are lost to other causes7.

**Livestock movement**

Connected solutions are also developed to track livestock, and even prevent theft. In France for instance, farmers have reported more than 10,000 thefts (includes livestock, equipment and crops) in 2013, an increase of 66% compared to 20068.

These solutions use different technologies, such as GPS (for tracking) as well as cellular or satellite to communicate with farmers. Farmers are also able to set geo-fences rules and notifications, in case of an animal leaving a specific area.

**Lactation**

Some automatic milking machines, such as those from manufacturer Lely, collect data using IDs and transponders attached to cows. The goal is to track cows when they are ready to produce more milk in order to notify owners, which can alter their diet to assist the lactation process.

**Different business models**

Providers of connected solutions for livestock use different business models. For instance, while both Fujitsu and Connecterra provide similar devices aiming at monitoring cows, the former charges up-front cost for its solution, while the latter providers the equipment for free and charges only for its insights, based on collected data.
At the same time, livestock and dairy farming remain difficult and low-margin businesses. Governments frequently have to help farmers in critical situations, for instance after difficult weather conditions or depressing prices. This is especially true for small farms, which do not benefit from economies of scale.

For instance, in France, dairy farmers were given “exceptional monetary assistance” in both 2015 and 2016. Furthermore, according to the MSA (the farmers’ social security in France), around 50% of farmers reported income below EUR 350 per month in 2016, compared to 35% in 2015. The average annual income dropped from EUR 14 000 to EUR 9 700, in two years only.

Connected solutions may help farmers improve the productivity, but farmers seem unlikely to invest without exterior help, such as dedicated loans.

Not all farmers are tech-savvy ...

Digital tools, such as computers and smartphones, are not yet totally generalised in farms, especially smaller ones.

According to a 2017 survey conducted by the United States Department of Agriculture, 73% of farms have a computer access, but only 47% of farms are using computers for their business. Furthermore, only 39% of farms use a smartphone or a tablet for farm business. Insights and services related to connected livestock need an access to such devices in the vast majority of cases, ... yet

However, younger generations of farmers tend to be more tech-savvy, and could turn to connected livestock solutions.

In addition, initiatives exist to encourage the usage of digital tools for farmers who are not tech-savvy. In Ireland, the Irish Rural League launched, in 2017, ‘IT Skills for Farmers’, computer training programmes for farmers, including those who have never used a computer.

**Figure 7: “Find my sheep”, a tracking solution for sheeps**

<table>
<thead>
<tr>
<th>Price of a single cow collar to detect estrus (Neckit)</th>
<th>59 €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of the data collector, obligatory to use the collars (Neckit)</td>
<td>159 €</td>
</tr>
</tbody>
</table>
About the Digital Transformation Monitor

The Digital Transformation Monitor aims to foster the knowledge base on the state of play and evolution of digital transformation in Europe. The site provides a monitoring mechanism to examine key trends in digital transformation. It offers a unique insight into statistics and initiatives to support digital transformation, as well as reports on key industrial and technological opportunities, challenges and policy initiatives related to digital transformation.


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