Study and development of a RFID integrated automatic traceability system for the bovine meat chain

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Introduction

The bovine meat production chain is complex both under structural and organizational profile due to:

- high number and production diversification of operators involved;
- large fragmentation in agricultural and industrial phases;
- remarkable import flow of cattle and commercial channels complexity.

Traceability can be easily achieved if considering every single step in the chain, but the main problem is the integration of different subsystems in the production process.
The innovative idea of this project was to consider the entire bovine meat chain as a single automated system.

Materials and methods

Technologies used at the different meat production chain levels were:

A - Breeding level
- E-tags (Demaplast, Italy)
- Cattle crush antenna - reader control unit (Edit ID, New Zealand) for stationary reading of electronic identifiers applied to farm animals;
- HHR3000Pro (ID&T, Norway), hand-held reader combined with a PDA;
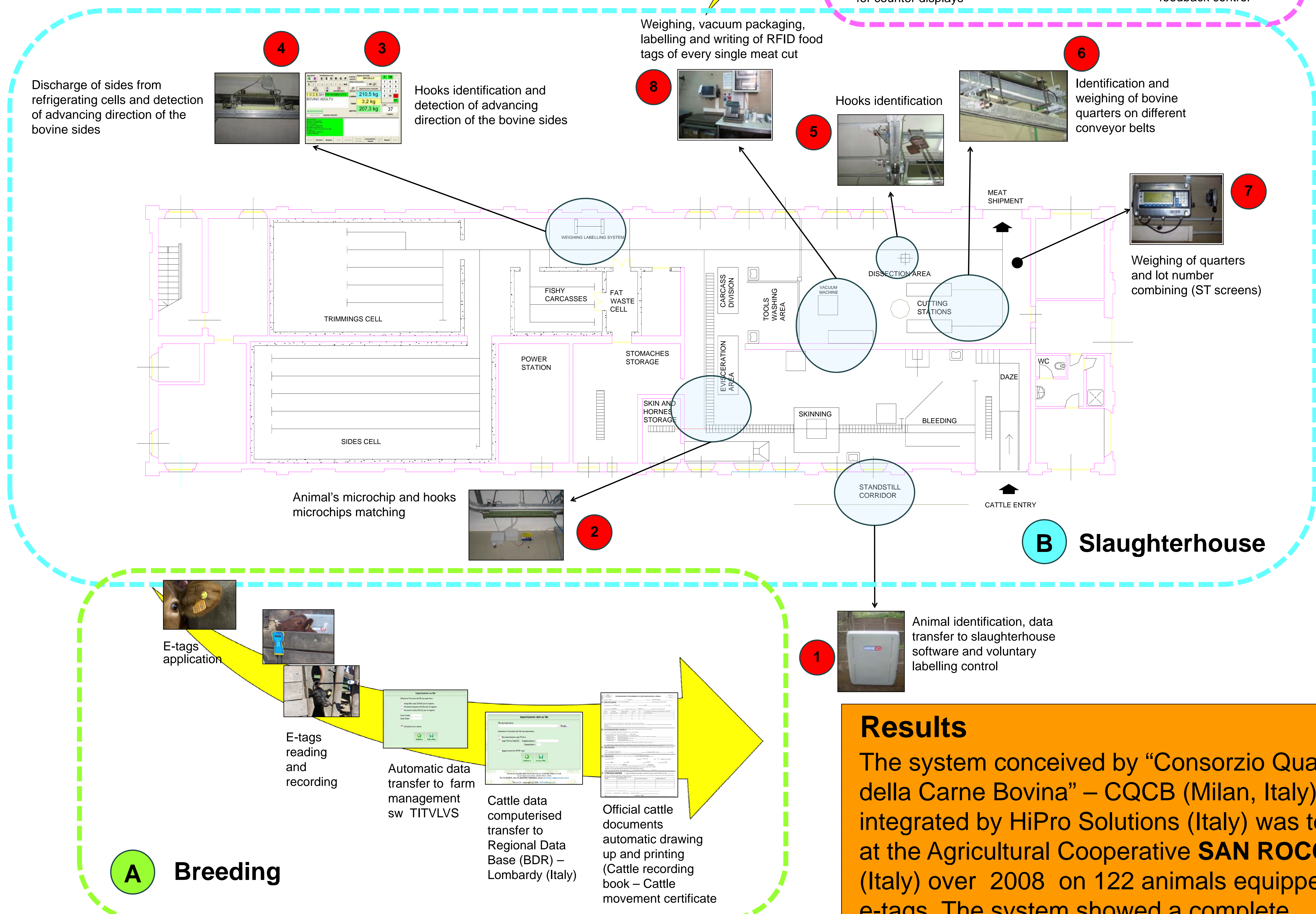- Management software (Titvlvs, APIS Software, Italy).

B - Slaugthering level
- Cattle crush antenna - reader control unit (Edit ID, New Zealand for ear tags and hooks matching;
- EMS readers and photocells;
- Microchips combined with identification hooks for carcasses recording;
- Specific software to manage slaughtering and dissection operations;
- Writing/Reading system of food tags for vacuum-packed anatomical cuts.

C - Store/shop level
- Management software (OpenStore);
- Reader/Writer of RFID codes;
- Weighing machines (Bizerba), with integrated RFID reading system.

C Store/shop

Meat data acquisition on specific sw (OpenStore) and writing of RFID flags for counter displays

Lot number automatic recall and receipts printing for final consumers

Automatic transfer of sold meat data from counter balances to OpenStore and feedback control

Implementation of the integrated system

Discharge of sides from refrigerating cells and detection of advancing direction of the bovine sides

Hooks identification and detection of advancing direction of the bovine sides

Weighing, vacuum packaging, labelling and writing of RFID food tags of every single meat cut

Hooks identification

Identification and weighing of bovine quarters on different conveyor belts

Weighing of quarters and lot number combining (ST screens)

Animal's microchip and hooks microchips matching

Animal identification, data transfer to slaughterhouse software and voluntary labelling control

B Slaughterhouse

E-tags application

E-tags reading and recording

Automatic data transfer to farm management sw TITVLVS

Cattle data computerised transfer to Regional Data Base (BDR) – Lombardy (Italy)

Official cattle documents automatic drawing up and printing (Cattle recording book – Cattle movement certificate

A Breeding

Results

The system conceived by "Consorzio Qualità della Carne Bovina" – CQCB (Milan, Italy) and integrated by HiPro Solutions (Italy) was tested at the Agricultural Cooperative **SAN ROCCO** (Italy) over 2008 on 122 animals equipped with e-tags. The system showed a complete functionality guarantying the full integration of the different steps and the back-data of sold meat quantities.

Conclusions

The system implemented allowed a favourable administration of the whole productive process, from the entrance of cattle in the step of slaughtering to the issue of the receipt for the final consumer, particularly referring to the maintenance of traceability data