AMPC

SNAPSHOT

INVESTIGATING WATER AND WASTEWATER REUSE AND RECYCLING OPPORTUNITIES: IDENTIFICATION AND SEGREGATION OF VARIOUS WASTE STREAMS

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Project Description

The main objective of this project is to progress water recycling and reuse in the red meat processing industry by providing a selection and assessment tool, incorporating cost benefit analysis (CBA), that will enable AMPC and industry members to evaluate specific water treatment options with consideration of raw water quality and desired end use application.

Project Content

Three high level of treatment process flowsheets were developed for abattoirs processing 500 – 1500 heads per day of beef cattle:

- Option 1: Covered anaerobic lagoon followed by biological nutrient removal technology (CAL-BNR);
- Option 2: Lagoon system anaerobic and aerobic ponds (AnL-AL);
- Option 3: Anaerobic membrane bioreactor followed by anaerobic ammonium oxidation (AnMBR-AAR).

After consultation with AMPC members, options 1 and 3 were selected to further develop the CBA models for water recycling options:

- Option 1:
    - CAL, SBR, MF/UF and chlorine for non-potable reuse;
    - CAL, SBR, MF/UF, RO, UV/H_2O_2 and chlorine for high quality water reuse.
- Option 3:
    - AnMBR, AAR, MBR and chlorine for non-potable reuse;
    - AnMBR-AAR, MBR, RO, UV/H_2O_2 and chlorine for high quality water reuse.

Project Outcome
This project is a tool for decision making on future implementation of water recycling scheme in abattoir. It has to be noted that no detailed quotation has been obtained for this project, and the cost estimate is a preliminary estimate only. It is recommended to involve AQIS and Queensland health at an early stage of the process to ensure their agreements to use water recycling within the abattoir.

Benefit for Industry
This project highlight the opportunities, benefits and value, as well as constraints of water recycling to the red meat industry through technology comparison tools and CBA models. Potential benefits include:
/ Save water intake and disposal costs;
/ Secure water consumption to freely operate;
/ Reduce dependence on external supplies;
/ Produce sustainable products meeting customers demand;
/ Improve operational performance (e.g. less chemical use for cleaning, boilers and cooling towers);
/ Preserve product value;
/ Recover nutrients from the wastewater with market value.

When considering water recycling/reuse, food safety and national and international product quality expectations and regulations need to remain the top priority. For this reason, the use of potable recycled water produced on-site is a challenge for international abattoirs

Water recycling in Australia
The recycling of wastewater after high level treatment is feasible according to the AQIS Meat Notice: 2008/06 “Efficient use of water in export meat establishments” (AQIS, 2008). Slaughterhouses may use recycled water from abattoir wastewater through a direct planned potable end-use scheme if they meet the following requirements:
/ Exclude human effluent from the water stream to be reused;
/ No physical connection between the potable and any other non-potable supply;
/ Follow the Hazard Analysis Critical Control Points (HACCP) principles;
/ Use a multiple-barrier approach;
/ Access to the potable local authority water system or other acceptable alternative supply in case of system failure;
/ Must meet the Australian Drinking Water Guidelines for potable water;
/ Must not use the water as a direct ingredient in meat products or use it for drinking water at the establishment.

Australian abattoir’s intending to use recycled water must contact AQIS before any construction and for final approval before utilization in meat processing operation.

Water recycling in Europe
Non-potable water can be used in the industry but should be clearly separated from the drinking water supply and for specific purposes as mentioned in the Australian regulation. The EU listed establishments have to test their potable water according to AQIS Notice Meat: 99/15 (AQIS, 1999). However, the European Commission Integrated Pollution Prevention and Control (IPPC) document clearly specifies that “food and veterinary legislation requires potable water to be used in slaughterhouses, so there are virtually no opportunities for re-use of water”. Since 2005, the position of the European Union (EU) changed and water reuse become a top priority area in the “Strategic Implementation Plan of the European Innovation Partnership on Water”. To-date, there is no water reuse guidelines or regulations at EU level (Alcalde Sanz and Gawlik, 2014). However, there are directives regarding food safety and the use of water reuse. Greece, Spain and Italy are the only European countries with current legislation allowing the use of recycled water from wastewater in food industry. However, Italy forbids the use of recycled water in direct contact with meat. Nowadays, there are two major barriers limiting the use of water reuse in the EU: (i) Limited awareness of potential benefits among stakeholders and the general public, and (ii) lack of a supportive and coherent framework for water reuse. For Europe, Australia is a good example to follow regarding its success to develop a national water recycling guidelines (NRMMC et al., 2006, 2008).

Water recycling in the USA
In the USA and under the current legislation, recycled water can be used in food processing or as an ingredient but should be at the same standard as drinking water. In some circumstances non-drinking water (i.e. non-potable) is used by the food industry, but should not be in contact with food (e.g. for fire control, steam production). In these instances, the water should be clearly identified as non-potable water and not connect or mix with the potable water supply used directly in food production.

Water recycling in Asia
To date, China does not have any slaughtering standards code. Thus, the use of recycled water meeting the Australia standards should not be an issue for Asian country establishments. However, it can be an issue for Japan.

USEFUL RESOURCES

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