



Abattoir hygiene and shelf life extension of its products.

The Hygiene status of an abattoir and the subsequent processing of carcasses and meat products are of the utmost importance, especially if the extension of the shelf life and safety to the consumer are the primary objectives.

Extension research has been conducted over the past three years over the various abattoirs, technological institutions and meat processing plants, in order to establish means of enhancing safety as well as shelf life extension. The technology applied was the process of electro-chemical activation of water by an on-site device. This device makes use of a powerful electrical field to split a saline (salt) solution into two different streams as follows:

ANOLYTE, which has a positive electrical charge. It kills bacteria, fungi and viruses as a result of damage done to the bacterial membrane. The product is completely non-toxic and breaks down in two days to form a weak salt solution if left in the open air. However, if properly stores in tightly sealed container anolyte remains biocide about twelve months and sporicide for about six months. Thus it is safe to ingest and cannot harm the environment. There are no disposal problems, and as the product is generated on-site, a constant supply can be obtained.

CATHOLYTE, which is the negatively charged portion. Catholyte can act as a detergent, removing layers of fat and protein. It is also non-toxic, in fact. As it is an anti-oxidant, ingestion of Catholyte may be beneficial to health in the same way as Vitamin A or E.



Both fluids are generated by EnvirolYTE units which vary in output capacity from 40 LPH and up to 4000 LPH and level of automation(see the pictures below). The devices are easy to operate, being automated, as well as inexpensive when one considers the cost of chemicals used each month in a processing plant.

The positively charged oxidant (Anolyte) solution is used in various applications in the meat processing industry in an attempt to improve hygiene and prolong shelf life of products.

The following areas of application were identified:

1. **Decontamination of carcasses** in chillers overnight by means of fogging with an Anolyte mist. Surface contamination of carcasses (reflected in Fig.1 and 2) has various sources of origin. Hygiene slaughter techniques are important in reducing surface contamination, but, despite rigid control measures, varying levels of contamination are still evident in carcasses destined for another processing. These contaminants are carried onto meat surfaces either from worker's hands, knives or soiled cutting boards and conveyor belts. In a recent study conducted on beef carcasses where Anolyte was fogged into chillers, the microbial contamination of the Anolyte treated beef carcasses was significantly reduced ($p=0.0001$), when compared to control carcasses.

Figure 1

Areas where contamination occurs – The slaughter process

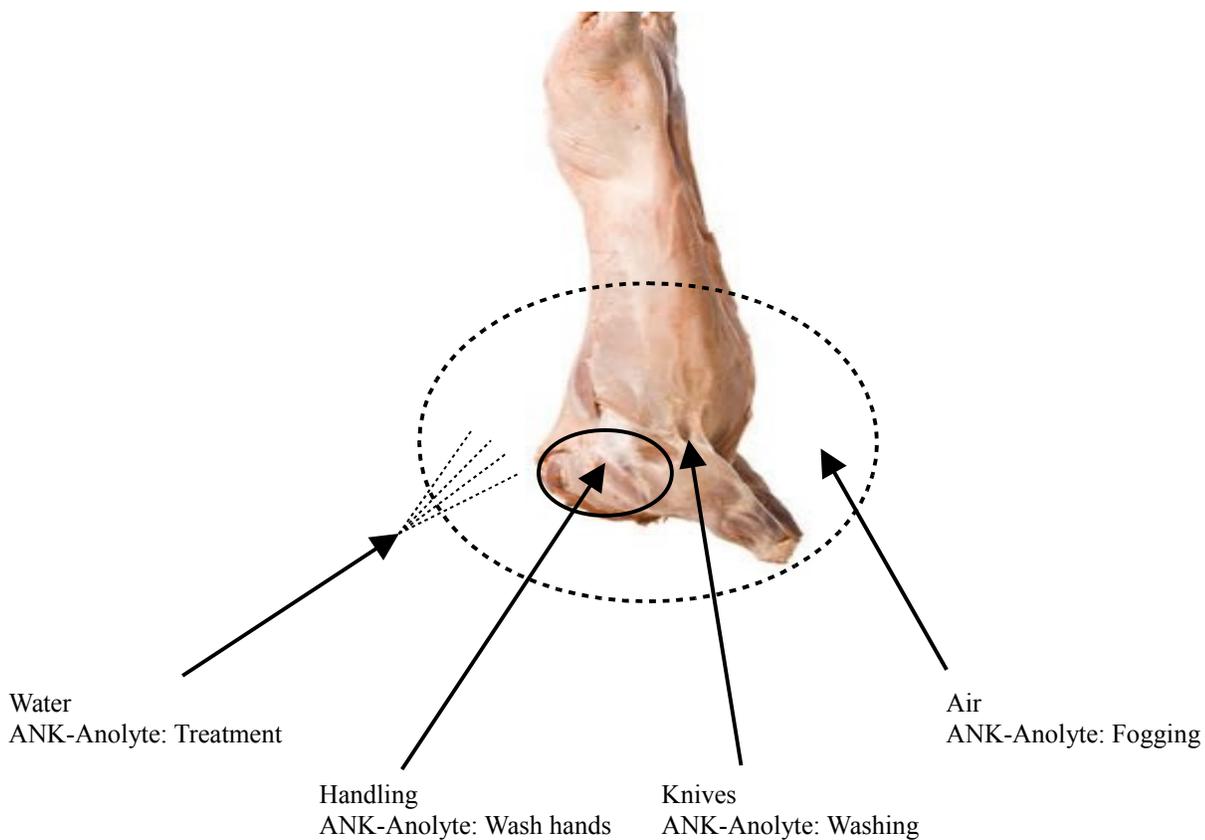
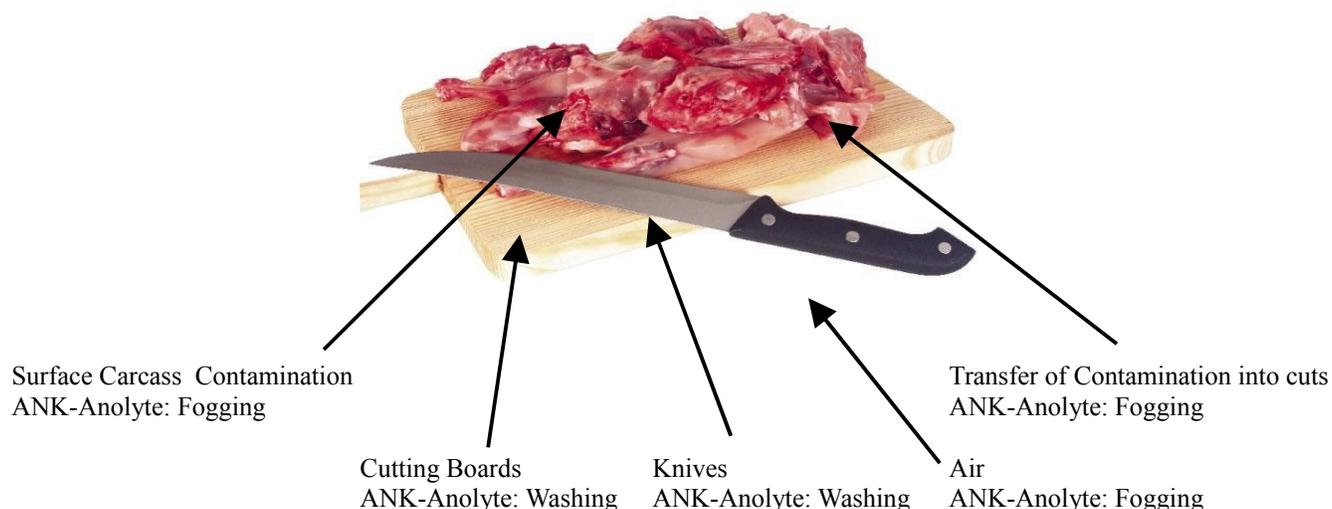


Figure 2

Areas where contamination occurs – The deboning process



2. **Reduction of carcass mass loss during chilling.** Carcass mass loss during overnight chilling may vary between 1.3 and 3.2%, depending on the mass and fat cover of the carcasses. A mass saving of 1% amounts to a significant value per carcass. These results have been confirmed by fogging with Anolyte instead of water. The added benefit is that carcasses can be decontaminated and carcass mass loss reduced simultaneously.
3. **Treatment of offal and casing.** If offal is immersed in Anolyte after rinsing in water, the shelf life can be extended by several days at ambient temperature, rendering this valuable source of protein edible for the end user without it going to waste. Table 1 (see below) gives the results obtained by the CSIR on 20/3/98, showing dramatic drops in the number of bacterial colony-forming units (cfu's) obtained after Anolyte treatment.

Table 1. Micro Report: Casings

SAMPLE TYPE	TEST TYPE	DET TIME (HRS)	BACT COUNT (CFU/100ML)
STRIPPED CASINGS			
Control:	TMA Coliforms C.Perfringens	1.2 1.8	8 160 000 521 600 8900
Treated:	TMA Coliforms C.Perfringens	23.8 No Growth	240 No Growth No Growth
UNSTRIPPED CASINGS			
Control:	TMA Coliforms	0.4 2.6	1 472 000 278 400

	C.Perfringens		400
Treated:	TMA	7.8	150
	Coliforms	8.5	10
	C.Perfringens		No Growth
CSIR Report No: CT 1117/98			

4. **Preservation of hides without salt.** This can be achieved by adding Anolyte to the water when ice is produced for preservation purposes. The main advantage is that bactericidal oxidants are released continuously during the melting process. This achieves several days extension over and above using ice cubes. Eliminating the use of salting prevents hide mass reduction due to dehydration. It also reduces the cost of salt and the application thereof as well as disposal of salt into the effluent at processing and tanning plants.
5. **Sterilisation of utensils and surfaces.** Sterility in an abattoir or meat processing plant can be achieved by the application of Anolyte as a bactericidal agent. Catholyte, a by-product produced simultaneously with the Anolyte, but which has a negative charge can be used as non-toxic detergent to remove abundant fat and protein deposits prior to the application of Anolyte. Considerable cost savings can be achieved by the on-site generation of multi-purpose detergent and disinfecting solutions.
6. **Treatment of incoming water.** Despite chlorinating water at the source contamination is evident at the point of use. This may be due to fluctuations in bacterial counts in municipal water or the development of a biofilm in the taps.

Conclusions:

Application of the technology in an abattoir has the following benefits:

- On-site sterility
- Biodegradable
- Safe
- Various economic benefits, e.g. carcass weight, shelf life extension
- Cost-effective
- No toxic chemicals
- No theft of detergents, chemicals, etc.

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