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Effect of raw material microbial contamination over microbiological profile of ground and pelleted feeds

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SUMMARY – In order to evaluate the effect of Salmonella and Clostridium contamination in raw materials and its influence on Salmonella and Clostridium contamination in feedstuffs, results of 1300 analyses are processed. The percentage level of Salmonella contamination in raw materials has a clear influence on Salmonella contamination in non-pelleted feedstuffs ($P<0.05$); however, considering pelleted feedstuffs, the relationship was not significant. The Salmonella contamination in pelleted feedstuffs is due to recontamination in the cooler, the truck or the silo and is independent of the percentage of contamination of raw materials. On the other hand, considering *Clostridium perfringens*, no significant relationships were found among the contamination percentage of raw materials and feedstuffs (meal and pelleted). Results are according to the well-known capacity of *C. perfringens* to resist high temperatures and form spores.

Key words: Feed, raw materials, contaminants, Salmonella.

RESUME – "Effet de la contamination microbienne de la matière première sur le profil des aliments moulus et granulés". On a traité les résultats de 1300 analyses pour évaluer l'effet de la contamination des matières premières par Salmonella et Clostridium et son influence sur la contamination des aliments des animaux par Salmonella et Clostridium. Le pourcentage de contamination des matières premières par Salmonella a une influence claire sur la contamination des aliments non granulés par Salmonella ($P<0,05$). Cependant, en ce qui concerne les aliments granulés, la relation n'a pas été significative. La contamination des aliments granulés par Salmonella est conséquence de la recontamination dans l'unité de refroidissement, le camion ou le silo, et ceci est indépendant du pourcentage de contamination des matières premières. D'autre part, on n'a pas trouvé de relations significatives entre le pourcentage de contamination des matières premières et des aliments (farine et granulés) dans le cas de Clostridium perfringens. Les résultats sont en accord avec la capacité connue qu'à *C. perfringens* pour résister à des températures élevées et former des spores.

Mots-clés : Aliment, matières premières, contaminants, Salmonella.

Introduction

The level of feed microbial contamination plays a key role in order to get a high quality animal production. Having pathogen-free feeds has a positive effect over productive parameters and over end products such as meat and eggs.

In order to get pathogen-free feeds, quality of raw materials and processes must be well known and controlled.

Material and methods

ADIVETER, S.L. Microbiology Laboratory tested for Salmonella, Clostridium and *E. coli* on 1300 samples without any bactericidal treatment. Samples were animal and vegetal raw materials and finished feeds and the tests were done following Spanish regulations (Or. 15.2.88 and R.D. 2224/93).

Results and discussion

Microbial contamination of raw materials is very variable and its effects depend on processing (meal or pellet) and on the micro-organism considered (Table 1).

Table 1. Percent contamination of different raw materials under Spanish regulations (%) (source: own data)

| Item | Salmonella | Clostridium | <i>E. coli</i> |
|-------------------------|------------|-------------|----------------|
| Wheat bran (n = 85) | 28.3 | 35.2 | 34.2 |
| Barley (n = 123) | 16.3 | 10.2 | 17.3 |
| Corn (n = 298) | 1.1 | 1.2 | 7.1 |
| Soya meal (n = 464) | 10.8 | 5.3 | 4.3 |
| Sunflower meal (n = 70) | 10.9 | 13.3 | 5.6 |
| Meat meal (n = 109) | 17.4 | 33.6 | 2.8 |
| Fish meal (n = 61) | 13.6 | 11.4 | 1.7 |

In the case of Salmonella contamination (Fig. 1), regression among percentage of positive raw materials and positive meal feed samples shows high significance ($P < 0.05$).

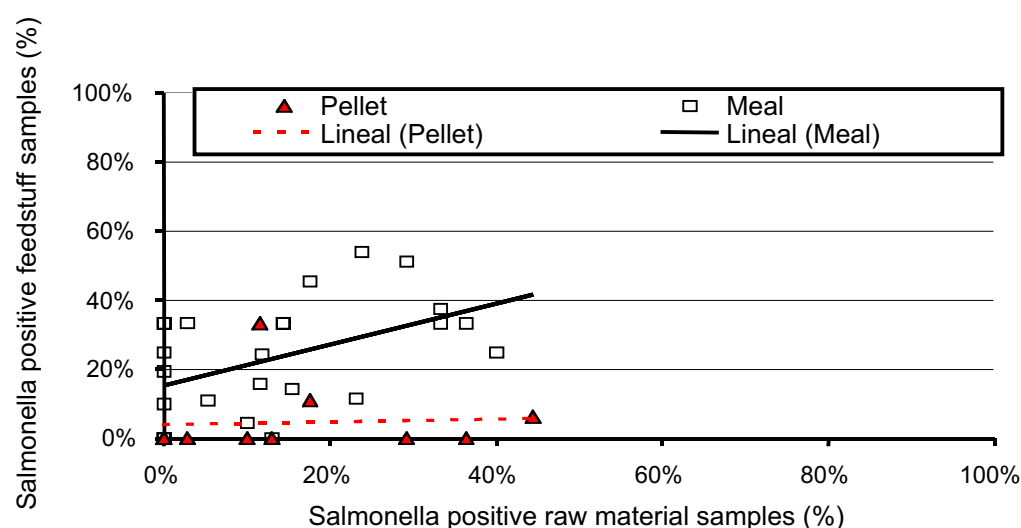


Fig. 1. Effect of raw material contamination of Salmonella over finished feeds (meal and pelleted).

However, in pelleted feeds, regression between percentages of contaminated raw materials and feed shows that presence or not of Salmonella in raw materials has no direct relationship with presence or not of Salmonella in pelleted feeds.

Although several studies show thermo-resistant strains of Salmonella, it appears that Salmonella isolated from pelleted feeds comes from re-contamination (coolers, carried over dust particles, trucks and many other ways).

Related to Clostridium positive samples (Fig. 2), regression among raw materials and finished feed (both meal and pellet) does not show any statistical significance.

Conclusions

Presence of Salmonella on raw materials is a very influential factor in order to find Salmonella on meal finished feeds (Fig. 1).

In pelleted feeds, regression slope shows that Salmonella does not come, directly, from raw materials. It comes from late re-contamination (coolers, dust particles, trucks, etc.).

As regards Clostridium, contamination of raw materials does not have incidence over finished (meal and pelleted) feeds (Fig. 2). Clostridium is widely spread through almost every substrate due to its thermoresistance and its spore forming ability.

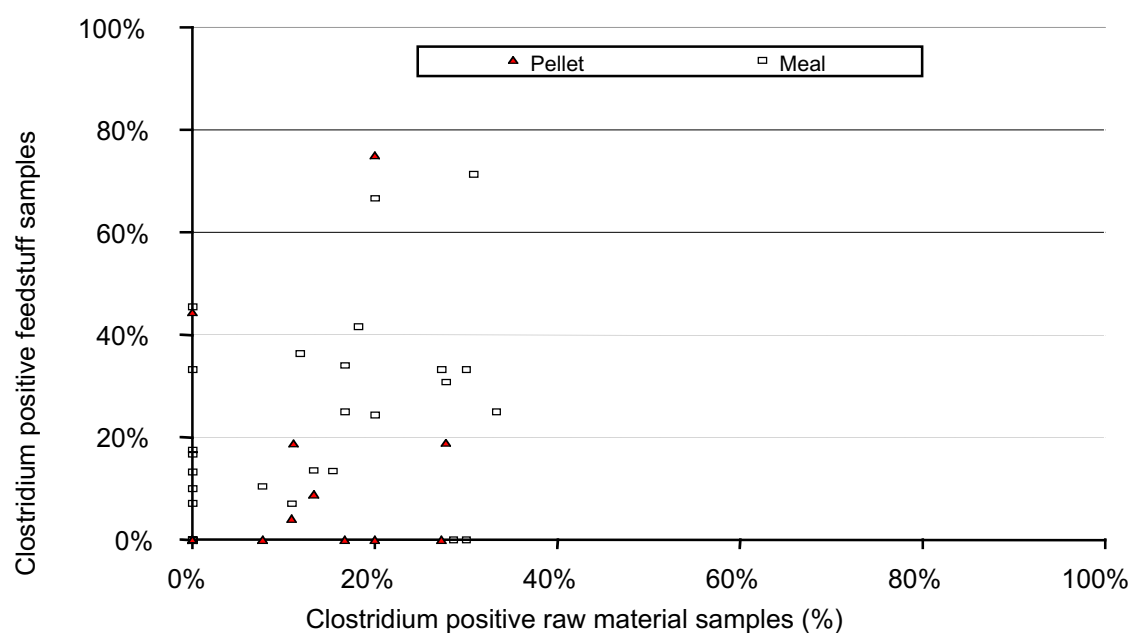


Fig. 2. Effect of raw material contamination of Clostridium over finished feeds (meal and pelleted).