

UNIVERSITA' CATTOLICA DEL SACRO CUORE  
FACOLTA' DI AGRARIA - PIACENZA



ISTITUTO DI SCIENZE  
DEGLI ALIMENTI E DELLA NUTRIZIONE



**COMPARATIVE EVALUATION  
OF FEED CONSERVATION  
IN FIBREGLASS AND METAL SILOS  
DURING SUMMER AND WINTER TIME**



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*Agritech srl has entrusted the Faculty of Agriculture of the Università Cattolica del Sacro Cuore, in cooperation with Cerzoo, the Research Center for Zootechnics and Environment of Piacenza (Italy) with a comparative study on the performance of some own-manufactured fiberglass silos and other silos in galvanized metal, produced by Chore Time. The study covers a period of time going from July 21<sup>st</sup> 2008 to February 2<sup>nd</sup> 2009.*

### **Aim of the study:**

The aim of the study was the comparative analysis of the conservation of bulk pig feed in mealy form stored in fiberglass and galvanized metal silos during summer and winter time.

### **Compared Samples**

#### 1. Storage silos.

The study was carried out on a total of 6 silos of 6 ton. capacity each., supplied by Agritech, 3 of which in fiberglass (VTR) and 3 in metal (MET). The silos were installed in pairs (VTR-MET) in the same environmental conditions with regard to the exposure to the sun.

#### 2. Stored feed.

The feed selected for the test was commercial compound feed in mealy form for pigs with live weight of 50-60 Kg., taken from the same production batch, and stored in the silos in the same quantity.



The silos were only loaded by 2/3 of their real capacity in order to reproduce the normal conditions of use in a standard farm, where silos are progressively emptied. To put in evidence eventual effects connected with non-ideal storage and environmental conditions typical of summer, some vegetal oil was added to the main feed as lipidic integration.

### 3. Period

The study was carried out from July 2008 to February 2009.

### 4. Surveys

During the 4-month summer test following surveys were carried out:

- a) Temperature ( $T^{\circ}$ ): using Min. and Max. thermometers, the values of  $T^{\circ}$  MAX.,  $T^{\circ}$  MIN. and  $T^{\circ}$  INSTANT in the external environment, the air temperature inside the silos (the empty volume between the cover of the silos and the surface of the feed) and the temperature of the feed (with a thermometer being placed in the first 10 cm of the bulk) were measured on alternate days.
- b) The amount of peroxides released over 20 days, based on feed samples taken from the superior and inferior part of each silo.

During the 3-month winter test following surveys were carried out:

- c) Temperature ( $T^{\circ}$ ): using Min. and Max. thermometers, the values of  $T^{\circ}$  MAX.,  $T^{\circ}$  MIN. and  $T^{\circ}$  INSTANT in the external environment, the air temperature inside the silos (the empty volume between the cover of the silos and the surface of the feed) and the temperature of the feed (with a thermometer being placed within the first 10 cm of the bulk) were measured on alternate days.



## 5. Results

As far as the summer period is concerned, it was noticed that:

- There are remarkable differences between the temperature of the air inside the silos and that of the stored feed in relation to the building material of the silos.

These differences, that arise from the majority of the surveys, are statistically significant, and they are indicated in the charts by some asterisks corresponding to the date of the survey. **As you can observe, the large amount of significant marks proves that fiberglass silos can stand thermal fluctuations and control both the air and the feed temperature better than metal silos.**

In fiberglass silos (VTR), instant, minimum and maximum temperatures resulted to be better than in metal silos (MET) in the majority of the surveys.

**Particularly, we observed higher MAX. T° of the feed in the upper part of the bulk and of the air inside metal silos, as reported in chart No. 3 *Delta T° between VTR and MET.***

As reported, these differences reach up to over 8°C in the air inside silos, with registered MAX. T° over 45°C in the metal silos.

The temperature of feed in the upper part of silos has reached temperatures between 35°C and 45°C in the metal silos, while in the fiberglass silos the highest temperature never exceeded 35°C (this peak was only reached in three surveys), The temperature *deltas* ( $\Delta$ ) comparatively registered in the temperatures of the feed stored in VTR or MET silos confirm the better performance of fiberglass silos, with a difference in favour of fiberglass up to 7°C .

- Regarding the amount of released peroxides registered in the upper and lower part of the feed bulk, the fiberglass silos **show a lower rate of peroxides and consequently a lower oxidation of the lipids contained in feed than metal silos (...).**



Chart No 1

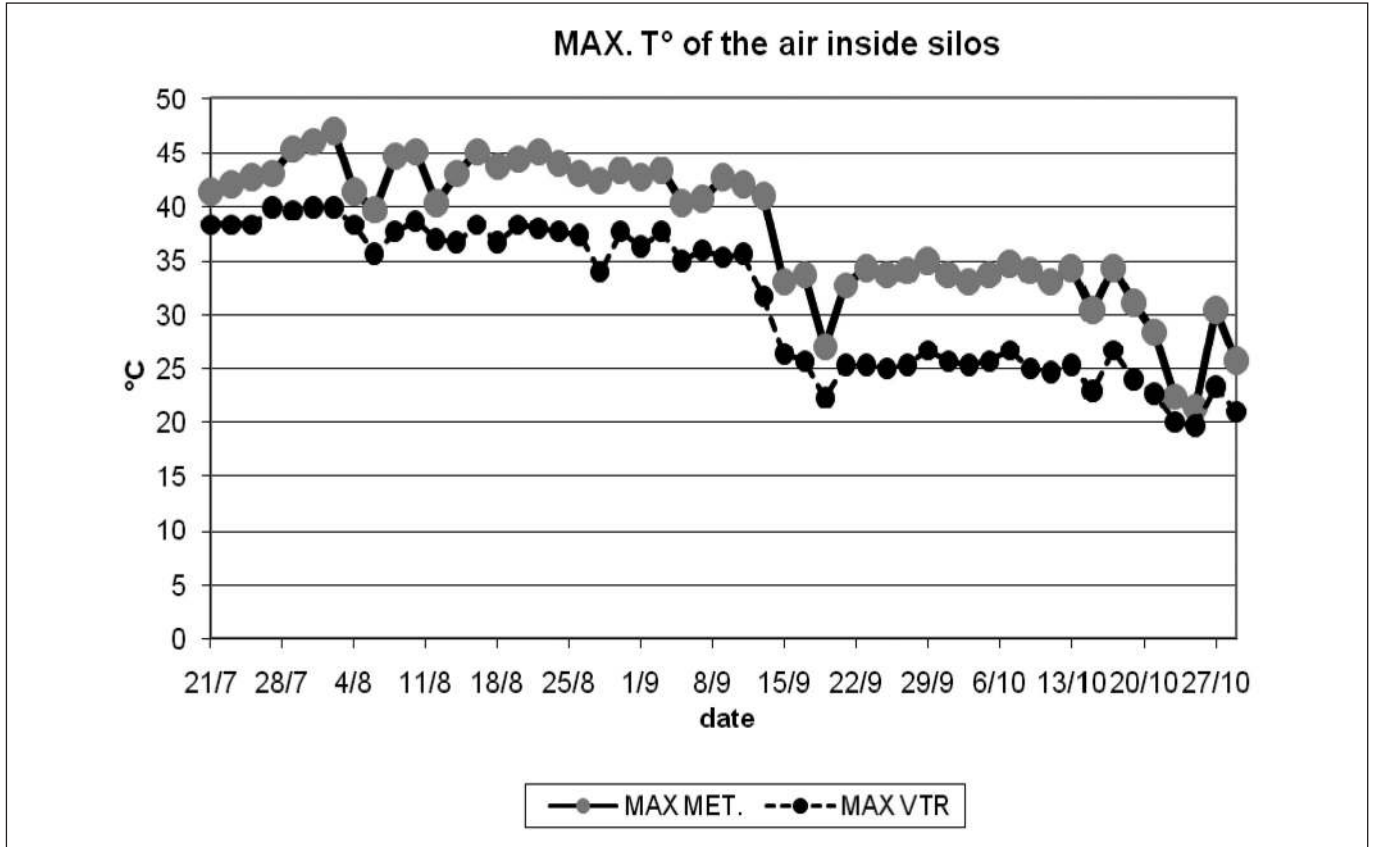


Chart No 2

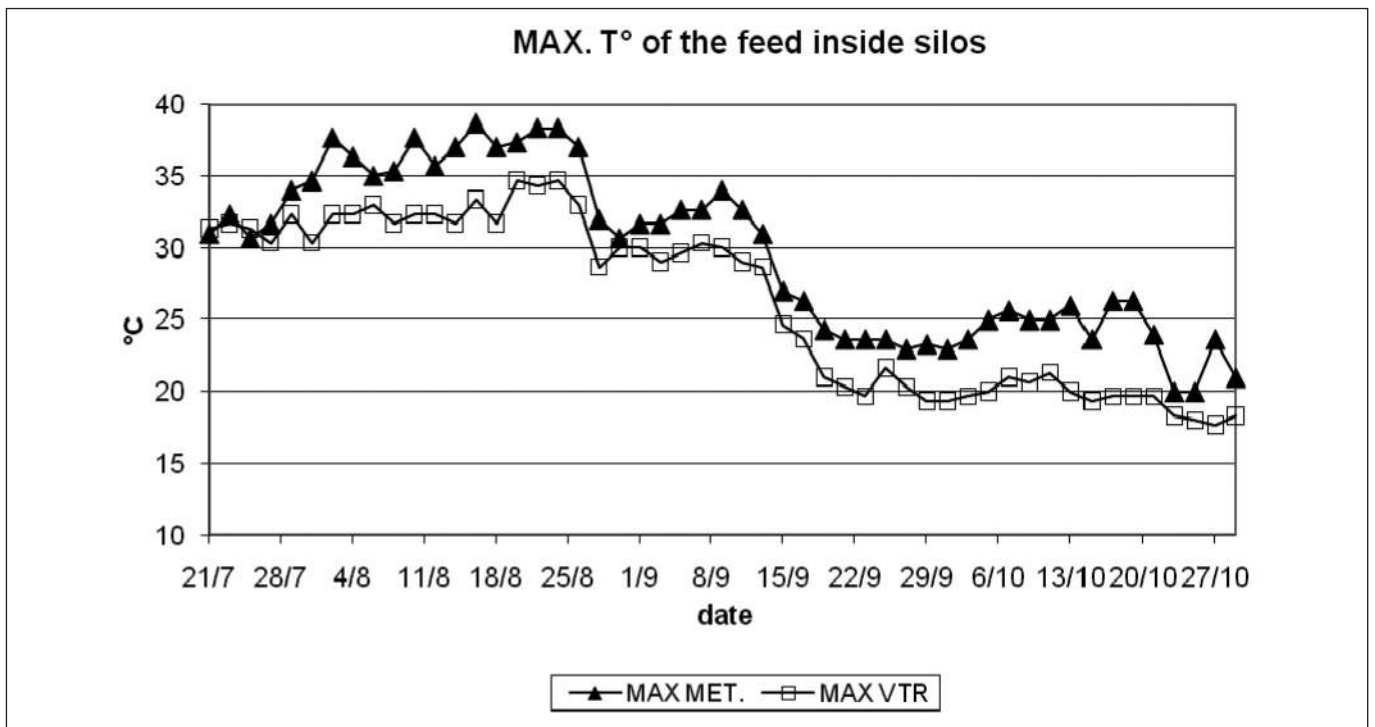




Chart No 3

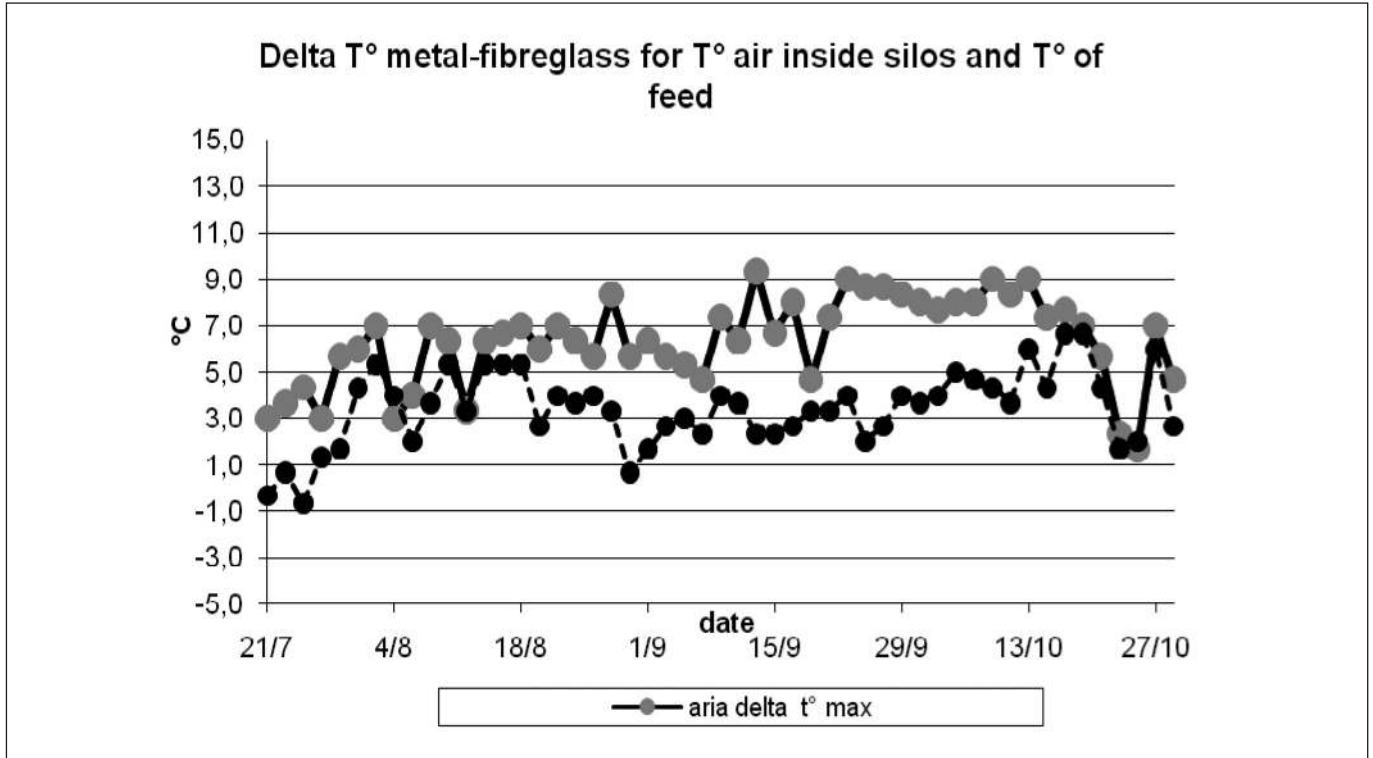
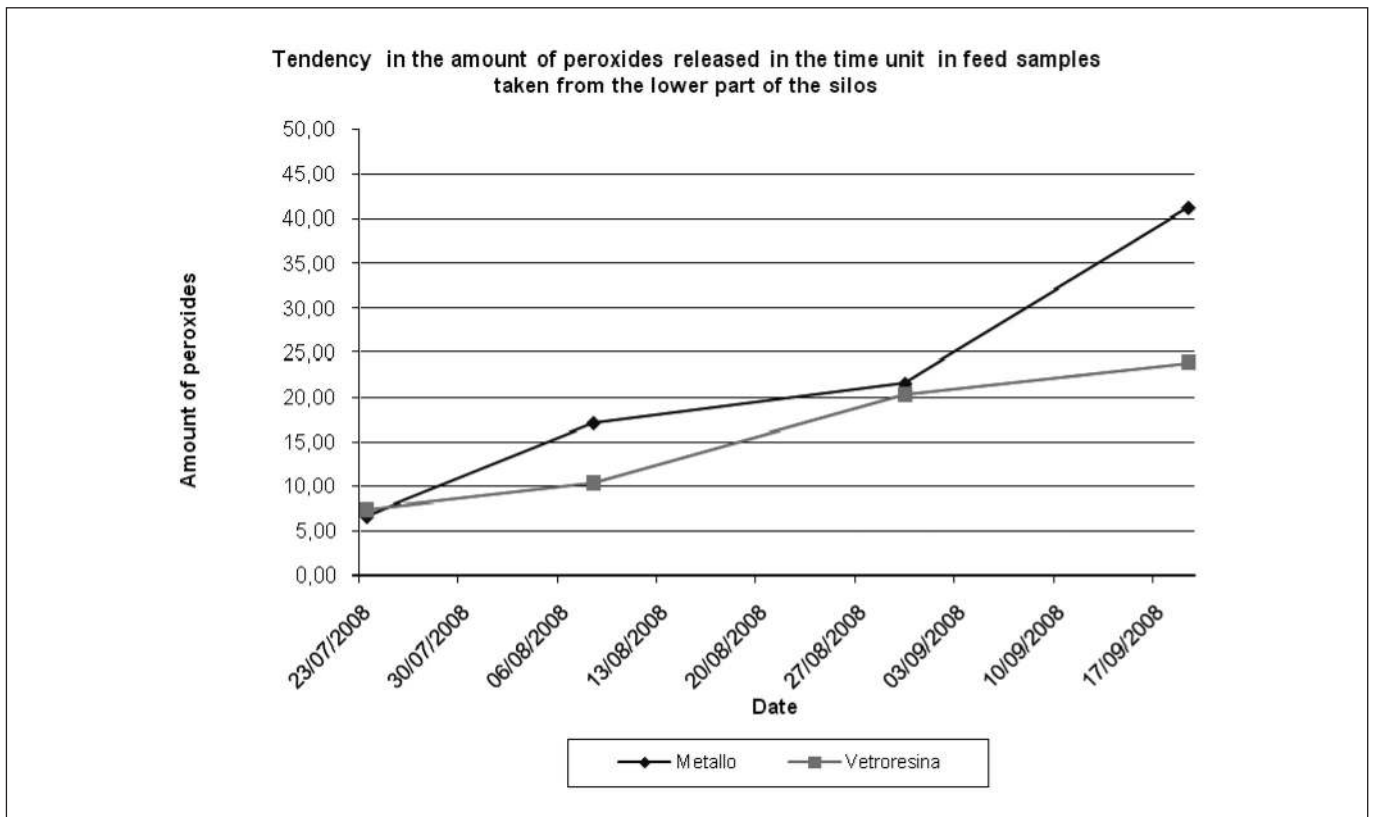


Chart No 4





Regarding the winter period (November 2008 - February 2009), we had following results:

- "Max. temperature of the air inside the silos: all temperature data registered in fiberglass silos are statistically inferior to those registered in metal silos. The average difference measured during the 15 test-weeks is about - 106,32%. These values in fiberglass silos tend to match with those of the environmental temperature in the "hottest" weeks, while, similarly to what happens with the minimum temperatures, the lowest ("coldest") values tend to be inferior to those measured in the outside environment".
- "Max. temperature of the feed inside silos: in the majority of the surveys, the MAX. T° of the feed stored inside fiberglass silos show values that are much inferior to those registered in metal silos.

Chart No 5 MAX. T° of the air inside silos

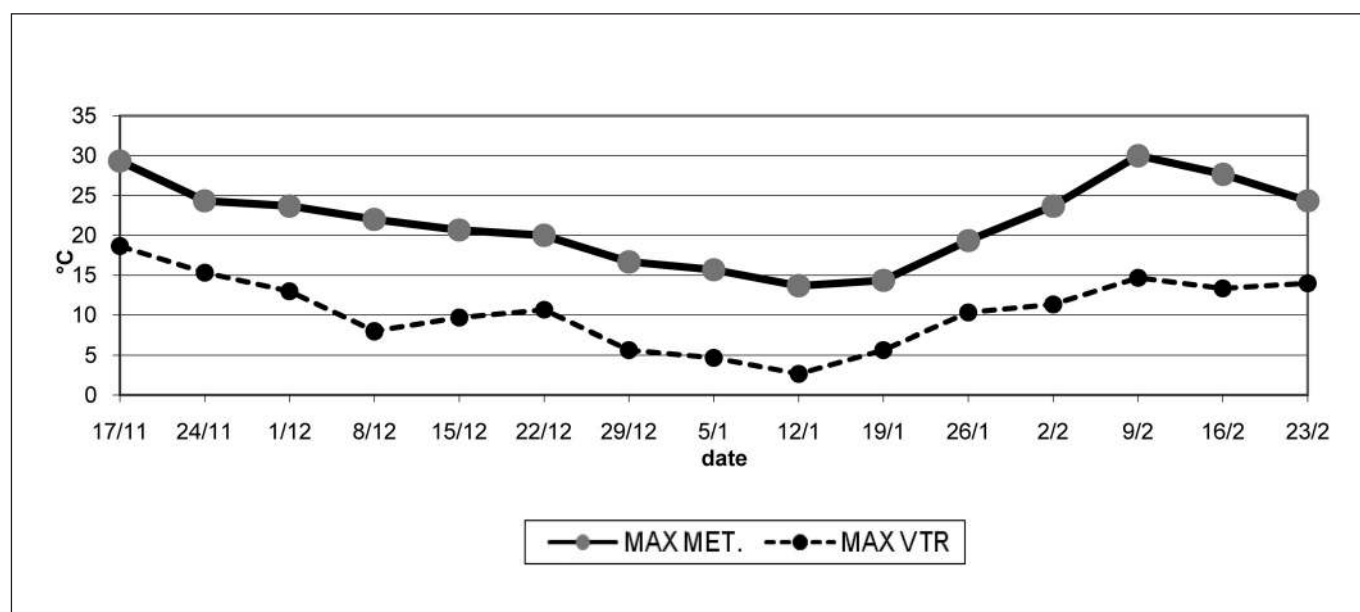
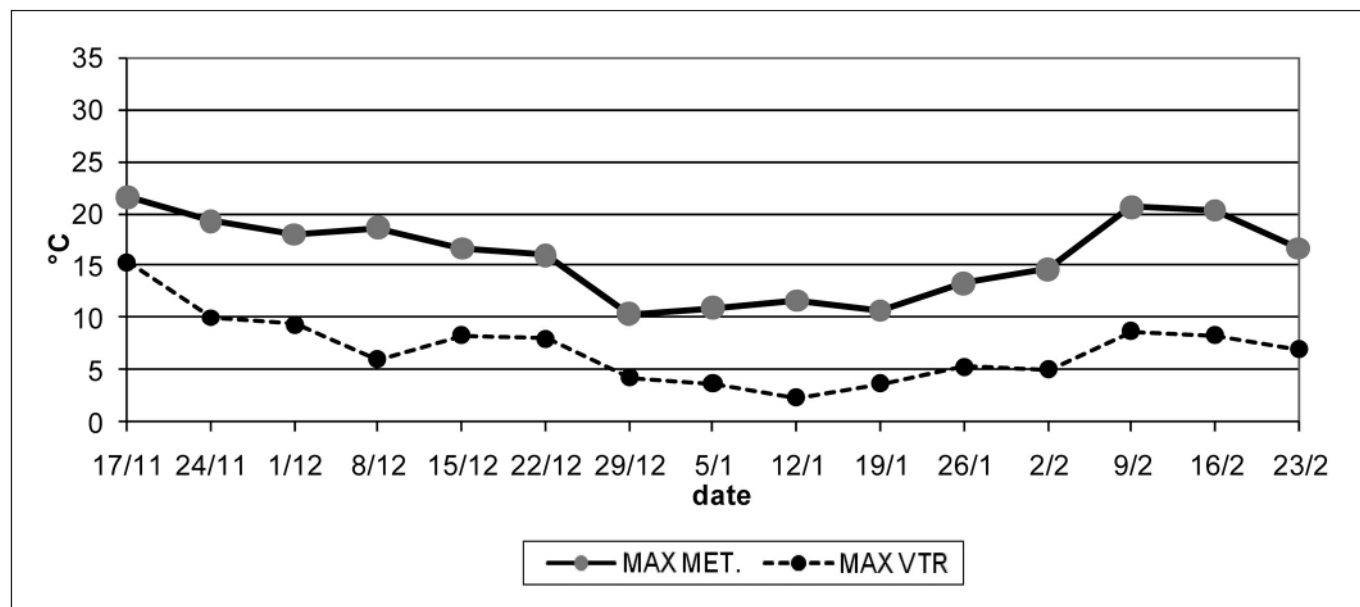




Chart No 6 MAX. T° of the feed inside silos



(...) “Finally, the results obtained in the second part of the test, which integrate and complete the results of the summer test (...), prove that also in the winter months the **temperature registered in the air and feed inside silos is the parameter which is subject to the most significant variations, and that it largely depends on the building material of the silos. In fiberglass silos, both the temperature of the inside air and the temperature of the stored feed bulk are averagely inferior to the temperatures registered in metal silos**”.

Prof. Gianfranco Piva