

GALLICA

Historical and Archaeological Interpretation

The Storage of grain in an Iron Age Four Post Granary



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Experimental Storage of Grain in a Four Post Iron Age Granary

Introduction

Since the advent of farming in the neolithic era, storage of grain has always been of great importance in many cultures. During the Iron Age in Britain there were two distinct methods, seed grain and animal feed went into pits in the ground, grain for human consumption was stored in granaries above ground to keep it dry. Grain pits have been extensively investigated by P.J.Reynolds in the 70's and 80's, at Butser Ancient Farm.

Experimental Aim

- To construct an Iron Age Granary as a Four Post-Structure
- To store harvested grain for a period of one year.
- To extract a daily quantity of grain to simulate family use.
- To record the temperature and humidity throughout the experiment.
- To test the remaining grain at the end of the experiment.

The Granary

The granary experiment started with the simple task of the construction of a grain store based on a "four post" structure". In excavations there are a large number of four post structures that are approx 1m x 1m, with no other evidence to indicate what the possible buildings were used for. The granary constructed was designed to be off the floor to keep the contents dry, and to reduce the possibility of pest infestation. Four oak posts of 20cm diameter, and 1m length, were prepared. The holes were dug centred at 1m between the posts, and 0.5m deep. The posts were put upright into the holes, levelled, and packed tight, using the earth dug from the holes. The main frame of the granary was built onto the top of their posts, with no fastenings between. The main structure of the granary was made entirely from oak. This gives the structure a stability, and longevity, as oak is resistant to pests, water, and rot. These qualities are important to keep the grain stored safely over the course of full year or more. The building was constructed of sawn and adzed timber, and assembled without the use of nails or screws. All joints were interference fit, and held together with carefully designed joints, and gravity. The main frame was substantial timbers approx 10cm x 10cm, with the walls of 2cm planking, slotted horizontally into rebates on the frame. The walls were designed to be feather boarded, thus shedding water outwards on all surfaces. The roof was attached to the top surface of the main box of the granary, using thick hazel rods for the rafters, and thinner rods for the purlins, in a four-sided pyramid shape, and then the roof was thatched with wheat straw. A 0.5m overhang was created on all four sides of the structure, protecting it from the weather. Doors were fitted on the front of the granary to also protect the interior from the weather. Within the Granary, a grain bin was constructed. Made from 2cm thick horizontal planking, with self locking joints on the corners, it was self supporting, and stood at a height of 1.4m. A gap of 10cm was left between the grain bin and the walls of the granary. This acted as insulation, and a moisture barrier. Total volume of the grain in was in excess of 1m³. There was sufficient room within the granary, to stand in front of the grain bin. A removable set of steps were constructed to enable access into the granary from ground level.

The Experiment

In 2011 the opportunity arose to obtain a quantity of threshed grain from a harvest of long straw that had been grow for thatch. In the course of threshing, 500kg of grain was bagged, brought to site, and placed in the grain bin within the granary. A partial lid was put on the bin to minimise anything falling into the grain from the roof of the granary. This lid covered three-quarters of the bin, from back to front, leaving access to the grain from the front of the bin. The 500kg of grain in the bin filled it to over two thirds, and the top of the stored grain was well within reach, when standing in the granary, in front of the bin. As the level went down, it was a simple matter of removing the top layer of planks from the wall of the bin to make the reach easier. To make the

storage of the grain as realistic as possible, the decision was made to extract from the bin, a quantity of grain on a daily basis, to simulate the use by an iron age family. It is understood that during the iron age, bread would have been baked regularly, so the decision was made to take out of storage, 1kg of grain every day for a year. A container was found that would exactly hold the physical volume of 1kg of grain. This measure was used throughout the experiment. Over the course of the following year, a measure of grain was taken out of the bin every day. (incidentally, the grain was used to feed some of the animals on the farm).

Recording

To check the storage quality a Digital Thermo-hygrometer was used on a weekly basis, to measure the temperature and humidity within the grain in the storage bin. Four months in, the temperatures of the interior, and exterior of the granary were added to the recording. Measurements were taken early morning throughout the experiment. The probe on the reader was inserted 10cm into the top surface of the grain, in random positions across the top of the grain. A written record of these measurements were kept throughout the experiment. The experiment was 8 months in before evidence of rodents was found in the grain bin. There were no rats in Britain during the Iron Age, so they only had mice and voles to deal with. The small trickle of grain through the corner joints seems to have been sufficient to have kept pests out of the bin until then. The data set is available, and includes basic weather information.

End of the Experiment

At the end of the year, the remains of the grain were tested. A pot of grain was put by the round house fire. overnight to parch, and then ground to flour in a hand powered rotary quern. A quantity of grain was soaked overnight in water, drained, and kept warm until it sprouted, proving viability and possible malting for beer.

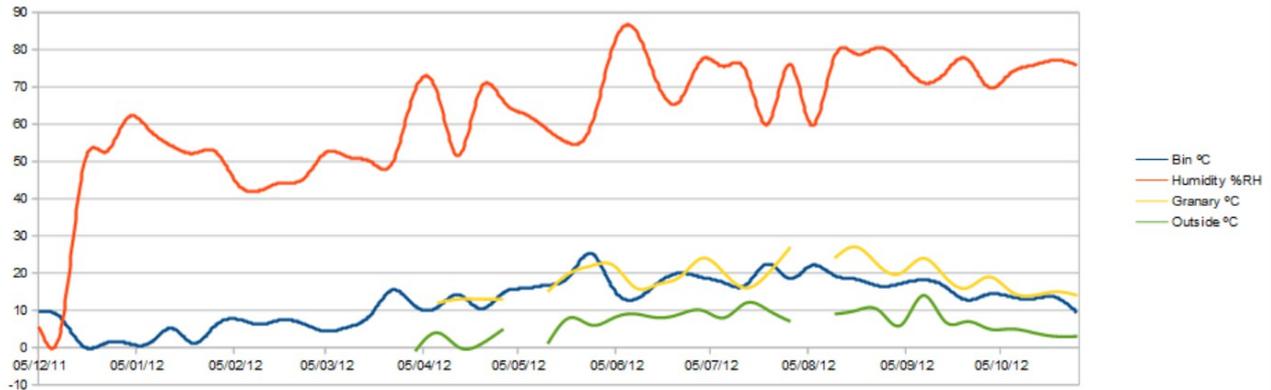
Conclusions

The bin in the granary was big enough to store 750kg of grain. This quantity should be sufficient for a family to have daily bread, and weekly beer, from the contents of a granary built on a 'standard' four post structure. In view of the number of four post structures in excavations, any number of granaries could have been in use. The grain was stable enough to have spare towards the end of a season, and traded for luxury goods, such as imported wine.

Statistics

Constructed:	2007
Grain Storage:	2011
Location:	South side of the Iron Age enclosure at Butser Ancient Farm
OS Grid Ref:	SU 71980 16451
what3words;	///unites.scariest.signs
Dimensions:	1m x 1.2m
Shape:	Rectangular
House Height:	3m
Wall Height:	2.4m
Ground Clearance:	0.6m .
Door Orientation:	15°
Door Width:	1.0m
Grain Stored:	500kg

Graph of Temperatures and Humidity in the Iron Age Four Post Granary



Photographs and Data Set

www.gallica.co.uk/papers/granary.zip

References

Danebury

Barry Cunliffe

English Heritage

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