Introduction
An effective scheme of cleaning and disinfection makes possible to reduce incidence and consequences of numerous diseases. Programs of cleaning and disinfection have been proposed for a long time to pig farmers but the recommendations have been more based on practical experience rather than scientifically established data. In addition, these operations considered as difficult and little gratifying are not always correctly implemented by pig farmers (Corrégé, 2002) and they represent a considerable cost, particularly in terms of working time. The aim of this study is to propose an optimised scheme of cleaning and disinfection for barns.

Materiel and methods
This study was led in the two ITP experimental farms. Various methods, at each principal stage of cleaning and disinfection of the buildings were compared in farrowing, post-weaning and fattening units (table 1). For each test carried out, the method to be tested was compared with a beforehand-defined standard program of cleaning and disinfection. This comparison was made either in the two halves of the same room, or in two identical rooms having contained the same batch. Efficiency of cleaning was approached by measurement of TPA (URL) and quality of disinfection by aerobic colony counts 48 hours after the disinfection(Corrégé et al., 2003), on 15 sites shared out within the room. (De Azevedo Araujo, 2002). Labour times and water and products consumption were recorded for each test in order to calculate the cost of these operations. Statistical analysis, both for TPA and bacterial counts, was carried out with software SAS, by variance analysis (GLM procedure) applied to logarithmic values of bacterial counts and URL.

Results and Discussion
Automatic soaking system (i.e. ramp of steeping with timer) in comparison with manual steeping (flat jet) doesn’t lead to any improvement of cleaning and disinfection (table 2). Nevertheless, it reduces considerably costs thanks to a saving of labour time of 30 hours per year for 100 sows. These results don’t join those reported by Foucher (1997), which allotted to automatic soaking a better effectiveness considering bacteriological results. Actually, it seems that the better general efficiency of automatic soaking thanks to the sequential water distribution is cancelled by a better local efficiency of manual soaking (the operator is spending more time when surfaces are difficult to wash or very soiled).

The use of a detergent, before or after the phase of pressure wash, allows a significant improvement of the quality of cleaning. On the other hand, disinfection is significantly improved only when the detergent is applied after pressure wash. Using detergent before pressure wash reduces time necessary to this operation, of 1.5 hours in farrowing units, 6.5 hours in post-weaning and 15 hours in fattening (for 100 sows in production). In farrowing units, the economy of time is not sufficient to compensate for the cost of the product. Yet, in post-weaning and fattening, there is a profit of 60 € per year for 100 sows.

The draining and the washing of the slurry pits improve decontamination of the rooms, and more particularly, of the grounds and the high parts of the walls. In the rooms where the slurry pits are emptied then washed, the quantity of alveolar dust (particles of diameter < 1µm) is reduced of more than 50%. Since particles measuring less than 4µm are able to carry bacteria (GUINGAND, 1994), the reduction of their number should limits the recontaminations.

Disinfecting with pulverization in comparison with foam leads to similar results in term of disinfecting efficiency. Thus, the better bacteriological efficiency of foam (in comparison with pulverization) brought back by Mahe (2002) has not been checked. The explanation could that the recommended quantities of disinfecting solution by m² of surface (0.3 l/m²) were scrupulously followed, which is unusual under farms conditions, because of the very large quantities of disinfecting solution required (120 litres / 100 m²). So time needed for pulverization is definitely higher than for foam (annual total over cost of 18.5 € per productive sow).

A second disinfection, either by foam or by thermonebulisation, results in a reduction of the bacterial contamination. Moreover, the thermonebulisation allows to reach inaccessible parts of the barn: the level of contamination of the slurry pits decreases significantly and is similar with the one obtained after the first disinfection of the pits using foam disinfection. In addition, the cost of a second disinfection by thermonebulisation is lower than the double disinfection using foam.

The heating of the room by “thermobile” at the end of disinfection process allows a faster drying of the buildings: heated rooms start to dry from the first day after disinfection and are completely dry at the end of 48 hours (temperature and hygrometry were recorded). On the contrary, in not heated rooms, drying starts later and humidity persists until day sixth after disinfection. In the second day after disinfection, the majority of the heated rooms presents a contamination lower than the not heated ones. Nevertheless, the only really significant reduction (34 observations, p≤0,05) was observed during a repetition carried out whereas the outside temperature was 2°C. Finally, heating seemed a good way to reduce contamination, at least in winter time. Its use 6 months per year represents an annual cost close to 600€.

Incidence of the heating on the level of contamination can be explained by two manners:
- Reduction of the dust level following a faster drying: the dried particles, lighter, can be eliminated more easily by ventilation and the risk of recontamination (by the deposit of this dust) is thus reduced.