MEAT COLOUR OF DANISH LANDRACE PIGS *ANNO* 1973 AND 1995. II. COLOUR STABILITY OF PORK CHOPS DURING CHILL STORAGE.

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Introduction.
Breeding systems with the main selection objective on producing lean meat with concomitant selection for increased growth and feed conversion rate may affect meat quality traits negatively. Thus, in British pigs, selection for leaner meat has been associated with reduced meat quality (Kempster *et al.*, 1986). A recent Danish study, which indicate a substantial decrease in the pigment content in *M. Biceps femoris* and *M. Longissimus dorsi* of the four Danish pig breeds during a five year period (Barton-Gade, 1990), has therefore invoked attention due to the connection between pigment level and colour.

Colour stability is an often neglected parameter in the evaluation of meat quality even though the modern consumer most often "buy by the eyes" under common retail conditions. The present work, which is a part of an ongoing study on meat quality of Danish Landrace, has investigated the colour stability of pork chops of Danish Landrace pigs *anno* 1973 and 1995, which differ significantly with respect to carcass lean content, daily gain and feed conversion (Petersen *et al.*, 1996). This has been done to ascertain whether 22 years of selection in Danish pig breeding has affected the colour stability of pig meat measured by determination of the tristimulus parameters (L*, a* & b*) during 6 days of retail storage with and without fluorescent light exposure.

Materials and methods.
Two days post mortem, 20 samples of *M.longissimus dorsi* were obtained from 10 Danish Landrace pigs *anno* 1973 and 1995, respectively. Pre-slaughter treatment and slaughter conditions were as described by Petersen *et al.* (1996). One part of one loin from each carcass was sliced into 2 cm chops. Each chop was divided into two parts, which were placed in individual plastic trays, wrapped in polyethylene and placed in an illuminated chill cabinet for 6 days. The cabinet temperature was approximately 4°C, however, during daily defrosting, the temperature rose to approximately 9°C. Half of the samples was covered with black plastic, allowing a direct comparison during storage of the colour of samples exposed to light and samples protected from light. Fluorescent tubes (Philips 18W/82) were used for illumination giving an average illuminance of 900 lx at the surface of the products in order to simulate conditions used during commercial retail display.

Colour measurements were performed using tristimulus colorimetry (L*, a*, b*). L*-, a*- and b*-values were measured 0 (30 min), 1, 4 and 6 days after slicing using a Minolta Spectrophotometer (CM-508i). Each sample was measured tenfold.

The effects of pig type, storage time and storage in light/dark were analyzed by a split-plot type analysis of variance including main effects of origin, storage time and type of storage and interactions between storage time and type of storage .

Results and discussion.
Figures 1, 2 and 3 show the tristimulus colometric parameters (L*, a* & b*, respectively) of pork chops stored (6 days, 4 °C) with and without fluorscent light exposure.

L*-values tend to be higher ($P=0.06$) on surfaces of chops from pigs *anno* 1995, which indicate a more pale appearance of these chops compared to chops from pigs *anno* 1973. L*-values were found to be higher in chops stored in dark than in chops exposed to light, but a highly significant interaction between storage time and type of storage (light/dark) ($P<0.0001$) shows that these differences are more or less pronounced during storage, as also seen in Figure 1.

No initial difference in a*-values was observed between the different chops (Figure 2), however, after 1 days of storage all chops had bloomed resulting in higher a*-values. After blooming (day 1) a significant difference ($P=0.025$) in the surface a*-values was found between chops from pigs *anno* 1995 and chops from pigs *anno* 1973 with the latter having the highest a*-values. The degree of blooming seems to be higher in chops in dark from pigs *anno* 1973 compared to chops from pigs *anno* 1995, while this is not evident in light stored samples. This difference can be explained by counteracting mechanisms, reduction *vs.* photooxidation in light exposed samples, while reduction must be expected to be the dominating mechanism in samples stored in dark. This higher degree of blooming in *M. Longissimus dorsi* from pigs *anno* 1973 compared to pigs *anno* 1995 might reflect difference in reductive capacity of the muscle, but more investigations are needed before any conclusions can be drawn.

The pronounced red colour fading (decreasing a*-value), which mainly is observed during light exposure (Figure 2), is expected due to light induced photooxidation of the meat pigment (Bertelsen & Skibsted, 1987). However, a significant interaction between type of storage (light/dark) and storage time after blooming ($P=0.0043$) makes it difficult to conclude more specific on each of these effects.

No initial difference in b*-values was observed between the different chops (Figure 3), however, after more than 1 day of storage a significant different (P=0.0007) was found between chops stored in light and dark with the chops stored in dark being more yellow (higher b*-values). No significant difference (P=0.86) in the b*-values between chops from the two types of pigs was registered during storage.

Conclusions.

The present study shows that chops from Danish Landrace pigs *anno* 1995 have a tendency to appear more pale at all times during storage than chops from Danish Landrace pigs *anno* 1973. Moreover, *M. Longissimus dorsi* from Danish Landrace pigs *anno* 1973 seems to have a higher blooming capacity during the first day of storage, which result in a significant higher redness of chops during subsequent storage compared to chops from pigs *anno* 1995. However, no evident difference in colour stability between chops from Danish Landrace pigs *anno* 1973 or 1995 was found from the present study.

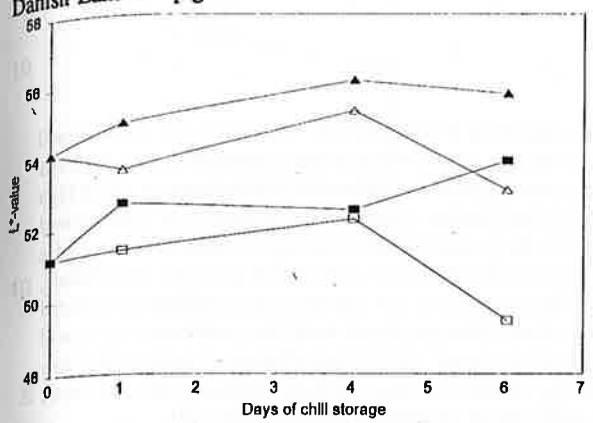

Figure 1. L*-values measured at the surface of chops from Danish Landrace pigs *anno* 1973 stored in light (-□-) and in dark (-■-) and at the surface of chops from Danish Landrace pigs *anno* 1995 stored in light (-Δ-) and in dark (-▲-) at 4°C for up to 6 days. Each point is an average of 10 samples measured in tenfold.

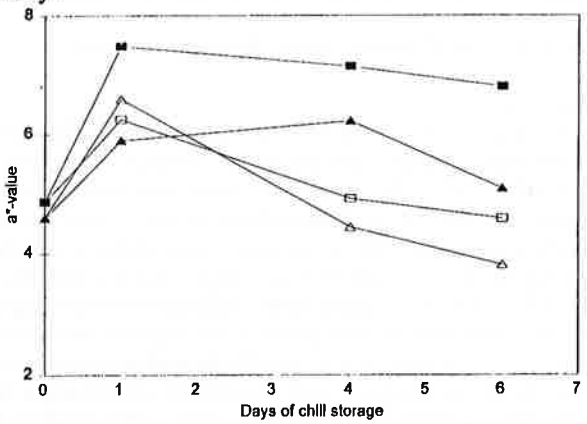

Figure 2. a*-values measured at the surface of chops from Danish Landrace pigs *anno* 1973 stored in light (-□-) and in dark (-■-) and at the surface of chops from Danish Landrace pigs *anno* 1995 stored in light (-Δ-) and in dark (-▲-) at 4°C for up to 6 days. Each point is an average of 10 samples measured in tenfold.

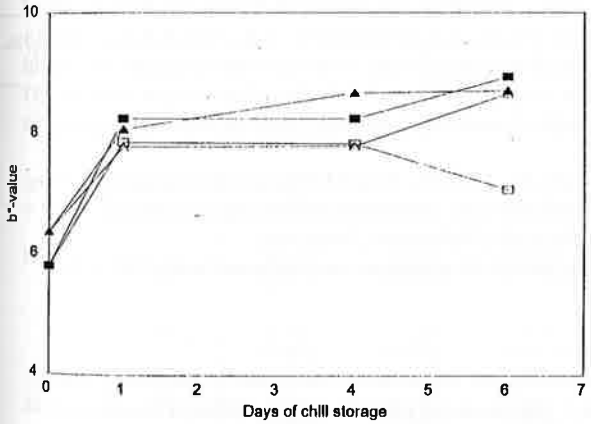

Figure 3. b*-values measured at the surface of chops from Danish Landrace pigs *anno* 1973 stored in light (-□-) and in dark (-■-) and at the surface of chops from Danish Landrace pigs *anno* 1995 stored in light (-Δ-) and in dark (-▲-) at 4°C for up to 6 days. Each point is an average of 10 samples measured in tenfold.

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