

# EFFECTS OF CLAW SHORTENING DEVICES IN LAYING HENS HOUSED IN FURNISHED CAGES

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## ABSTRACT

Seventeen weeks old ISA Brown pullets (n=642) were housed into two models of furnished cages. Model A had egg baffles with two claw shortening devices (CSD) per cage, placed in horizontal position (HP). Model B had no egg baffles and two CSD per cage were placed on the rear of feeders, in vertical position (VP). Two types of CSD were used, either abrasive strips or ceramic plates. A third group of birds was housed in conventional cages, with or without strips in VP. Several measures were taken at 18, 35, 49, 62, and 78 weeks of age in a random sample of 10%

of hens. The following variables were measured: length of central claw, type and number of feet lesions (FL), and feather cover score (FC). Data were analyzed using a GLM model (SPSS package). The main effects tested were CSD type, CSD position and age. The results suggest that both CSD types were efficient for shortening hen claws and for keeping plumage in good condition, particularly if placed onto egg baffles. However, when placed in such position they may possibly have a negative impact on layers welfare by increasing frequency of toe wounds.

KEY WORDS: Claws, furnished cages, layers, toe wounds, welfare.

## RESUMO

### EFICIÊNCIA DE DISPOSITIVOS DE DESGASTE DE UNHAS PARA POEDEIRAS ALOJADAS EM GAIOLAS ENRIQUECIDAS

Alojaram-se 642 frangas ISA Brown com dezessete semanas de idade em dois modelos de gaiolas enriquecidas. O modelo A possuía defletor de ovos onde foram colocados dois dispositivos de desgaste de unhas (CSD) em cada gaiola em posição horizontal (HP). O modelo B não possuía defletor de ovos e os dois CSD foram colocados em posição vertical na parte externa dos comedouros em posição vertical (VP) no interior da gaiola. Empregaram-se dois CSD, lixas adesivas e placas de cerâmica. Um terceiro grupo de aves foi alojado em gaiolas convencionais sem CSD. Realizaram-se diversas avaliações numa amostra de 10% das aves nas semanas 18,

35, 49, 62 e 78 de idade. Avaliaram-se o comprimento da unha central, o tipo e o número de lesões (FL) e a condição da plumagem (FC). Procedeu-se à análise dos dados mediante o uso do procedimento GLM do pacote estatístico SPSS. Os efeitos principais foram tipos e posição de CSD e idade das aves. Os resultados demonstraram que os dispositivos de desgaste de unhas foram eficientes para encurtar as unhas e para a manutenção da plumagem, principalmente quando colocados sobre os defletores de ovos em posição horizontal. Entretanto, nesta posição podem afetar negativamente o bem-estar animal, por causa do aumento de lesões nos pés.

PALAVRAS-CHAVES: Bem-estar, gaiolas enriquecidas, poedeiras, unhas, lesões.

## INTRODUCTION

In the 70's, 80's and 90's approximately 95% of all eggs produced in developed countries came from hens housed in cages. At that time, particularly in Northern Europe, the first questions related to the hens' welfare started to take place. In Spain, for instance, the council directive (1999/74EC), incorporated into law, stated that by January 2003 all existing and new cage system must include a suitable claw shortening device (CSD) to prevent excessive claw growth. Up to now, however, the large variation in cage designs makes it very difficult to produce a standard for placing the CSD. The CSD are normally located in the access area to the feed trough, more specifically on the eggs saver (VAN NIEKERK & REUVEKAMP, 2000), because bird's claws scrape against them while eating.

Studies show that cages enriched with CSD offer benefits for hens, reducing the claw length and the risk of entrapment (TAUSON, 1998), but not improving plumage condition (TAUSON, 1986; GLATZ, 2002). The effect of CSD on mortality seems to be variable (GOODLING et al., 1984; TAUSON, 1986). GLATZ (2002) reports that the use of abrasive strips increases both mortality from prolapse and cannibalism. The most common CSD studied so far are strips of abrasive tape (TAUSON, 1986), abrasive paint coated onto the egg guard (TAUSON, 1996), metal plates with filings, glue and sand (VAN NIEKERK, 2000).

This experiment aimed to evaluate the effect of two types of CSD positioned in two different places into the cages on layers claws length (CL), feet lesions (FL) and feather cover (FC).

## MATERIALS AND METHODS

A total of 642 ISA Brown pullets (17 weeks old) were housed at the Poultry Experimental Unit of the University of Saragosa – Spain, into two models of furnished cages (10 birds per cage) and conventional cages. Type “A” contained egg baffles, with 2 CSD per cage placed in horizontal position (HP). Type “B” had no egg baffles, and 2

CSD per cage were placed on the rear of feeders in vertical position (VP). Two types of CSD were used, either abrasive strips or ceramic plates (Figure 1). A third group of birds (control) was housed in conventional cages (6 per cage), without strips. The furnished cages had a nest and a litter. The cages were 120 cm wide, 63 cm deep, 40 cm high at the front and 45 cm high at the back, with a floor slope of 12°. The average area per bird was 600 cm<sup>2</sup> in the main part of the cage and 150 cm<sup>2</sup> in the nest area (total floor space per bird was 750 cm<sup>2</sup>). Feeder area was 12 cm per bird and the space in the dust bath was 120 cm<sup>2</sup> per bird.

At the beginning, all birds were subjected to 12 hours of light and 12 hours of darkness, with a weekly half hour increasing up to 17 hours of light (and 7 hours of darkness). This photoperiod was kept until the end of trial (78 weeks of age). Birds were fed grounded feedstuff (2,700 kcal ME/kg, 17.2% C.P. and 3.5% Ca) up to 55 weeks. After that they were fed a diet containing 2,750 kcal ME/kg, 17% C.P. and 4.2% Ca until the end of experiment.

At 18, 35, 49, 62, and 78 weeks of age a 10% random sample of hens were visually assessed for feet lesions and feather covering, using a four-point scale (TAUSON, 1984). The feather score was recorded in the neck, back, wings, tail, cloacae area and breast. Overall average score and the values for each part of the hen's body were determined (4: very good plumage and completely covered with feathers; 1: Very damaged plumage and uncovered). At the same time, claw length was measured on the right foot using a metric tape (VAN EMOUS, 2000).

Data were analyzed using the GLM procedure (SPSS package).

The statistical model used was:

$$Y = \mu + L_i + P_j + E_k + (LPE)_{ijk} + e_{ijk}$$

were:

$L_i$  = effect of CSD

$P_j$  = effect of position

$E_k$  = effect of age

$LPE_{ijk}$  = interaction

$e_{ijk}$  = experimental error.

Additionally, non-parametric statistics was used when needed. To test for differences in the frequency of feet lesions we used the Wilcoxon rank sum procedure (Mann-Whitney U-test). CSD type, CSD positions were treated as the experimental unit and, for all traits, individual

birds were used as replicates. Also, Spearman's correlation coefficient was used. The level for statistical significance was set at ( $p \leq 0.05$ ) and statistical tests were performed using SPSS 11.0 for Windows.

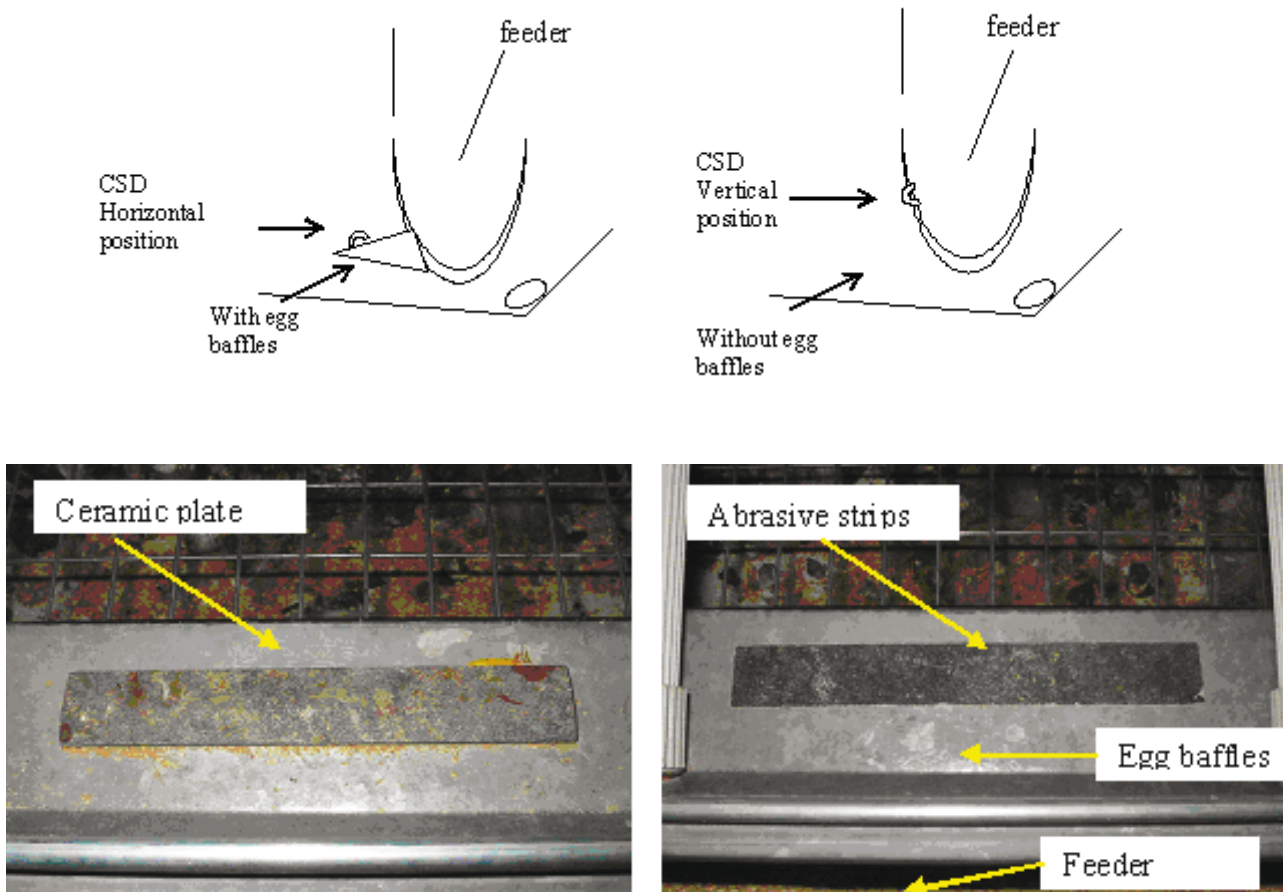


FIGURE 1. Schematic representation of claw shortening devices positioning.

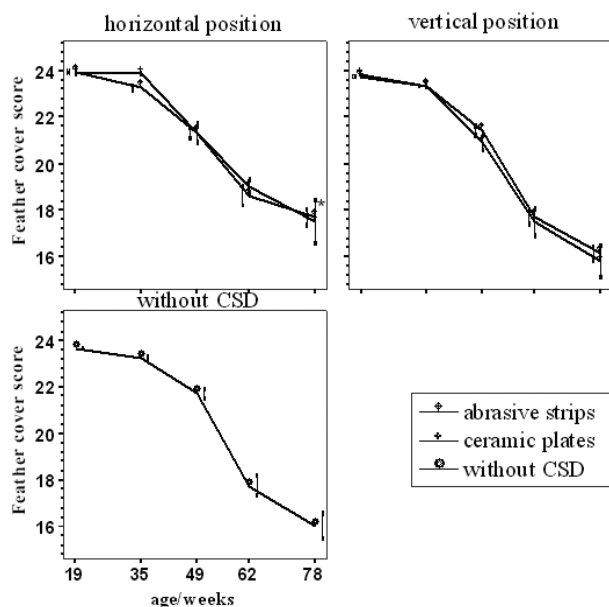
### RESULTS AND DISCUSSION

As expected, plumage quality decreased as the age increased. After 35 weeks of age laying hens housed in cages containing CSD presented numerically better plumage quality (Figure 2), even though significant differences were observed only at 78 weeks. The same tendency was observed by CEPERO et al. (2001).

A possible explanation for the better plumage is mainly due to a higher abrasion of

birds' claw. This hypothesis is based on the negative correlation observed between claw length and the plumage score in the birds back (-0,406; Spearman's correlation coefficient;  $p=0,01$ ). Additionally, the hypothesis is also based on the not so high negative correlation between claw length and total plumage score (-0,383;  $p=0,01$ ). No significant differences were obtained among ceramic plates and abrasive strips in terms of maintenance of total plumage of laying hens (Figure 2). It can clearly be observed that the data

are very similar. The curves almost superpose each other during the whole laying period, indicating that both mechanisms presented the same abrasiveness. The CSD effectiveness for maintaining a better plumage depends on their

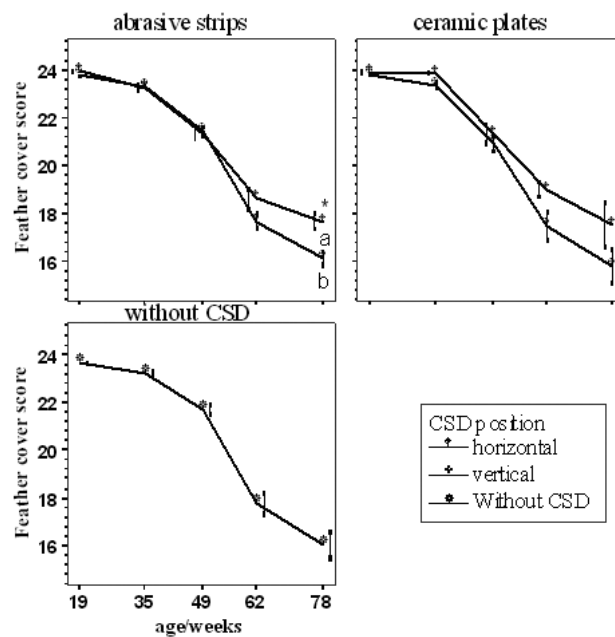


**FIGURE 2.** Mean ( $\pm$ SEM) feather score of hens housed in furnished cages fitted with different types of CSD. Means followed by a \* are significantly different ( $P \leq 0.05$ ) from control (without CSD).

At 35 weeks, claws of hens housed in cages with CSD were significantly shorter ( $p \leq 0.05$ ) than the ones housed in conventional cages (without CSD) (Figure 4). The biggest difference was found at 78 weeks ( $2.7 \pm 0.06$  vs.  $3.5 \pm 0.11$  cm). The results showed that CSD exert a vast abrasive effect on the claws (TAUSON, 1996; TAUSON, 1998; VAN NIEKERK, 2000; FIKS-VAN NIEKERK, 2002; GLATZ, 2002). The effect of age was also significant ( $p \leq 0.05$ ), since length of claws increased with age. VAN EMOUS (2003) obtained a similar response using a light hybrid.

Significant differences in claw length or frequency of FL were obtained when abrasive strips or ceramic plates were used. This effect is probably related to the abrasive efficiency. The position but not the type of device influenced the

position. Figure 3 shows that the only statistical difference for total plumage score was obtained at 78 weeks ( $17.69 \pm 0.416$  CSD in HP vs.  $16.14 \pm 0.373$  CSD in VP,  $p=0.02$ ).



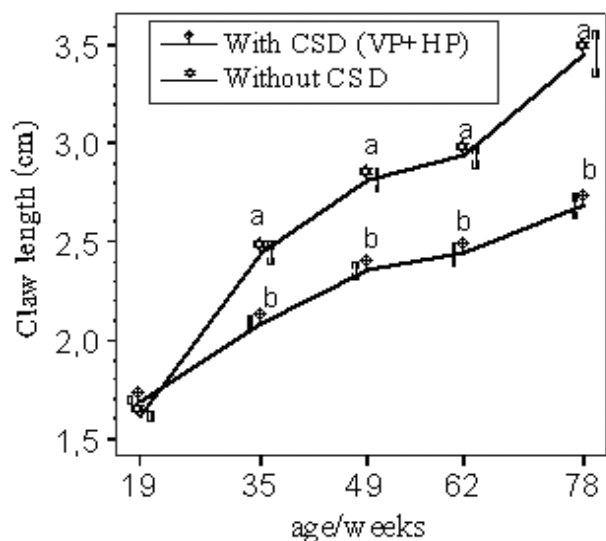
**FIGURE 3.** Mean ( $\pm$ SEM) feather score of hens housed in furnished cages fitted with CSD at different positions. Means within week followed by a different letter are significantly different ( $P \leq 0.05$ ). Means followed by a \* are significantly different ( $P \leq 0.05$ ) from control (without CSD).

claw length (Table 1). At 78 weeks CSD placed in VP showed less efficiency for shortening claws ( $2.77 \pm 0.13$ ) than when placed onto egg baffles, in HP ( $2.10 \pm 0.11$  cm) (Figure 5).

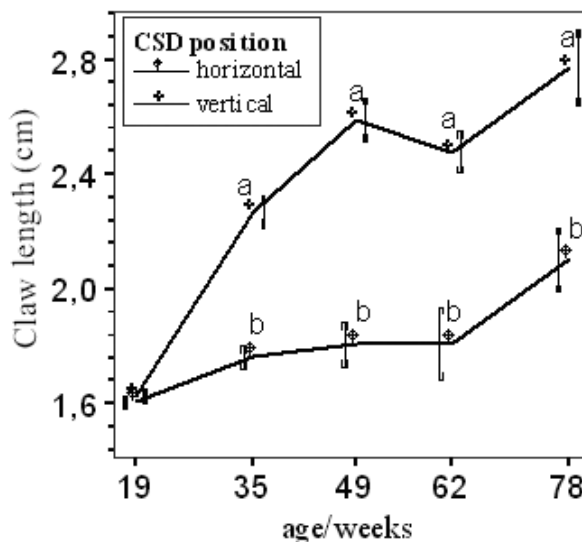
An interaction between CSD type and position was observed for FL. This variable did not change with CSD type when placed in HP. However, when placed in VP, abrasive strips caused more toe wounds and less broken claws than ceramic plates (16.7% and 6.3% vs. 2.8% and 19.4%, respectively). In terms of ceramic plates, more toe wounds and less broken claws were observed when they were placed in HP than in VP (41.7% and 0% vs. 2.8% and 19.4%, respectively). FIKS-VAN NIEKERK et al. (2002) reported that more abrasive devices decrease the frequency of broken claws. The results observed for toe

wounds and broken claws for hens in the control group (without CSD) were 16.4% and 12.6%, respectively. Both were significantly different to those found for the groups placed in furnished

cages with CSD in HP. This causes a potential welfare problem, since claw shortened efficiency might be related to frequency of toe wounds.



**FIGURE 4.** Mean ( $\pm$ SEM) claw length of hens housed in furnished cages with or without CSD. Means within week followed by a different letter are significantly different ( $P \leq 0.05$ ).



**FIGURE 5.** Mean ( $\pm$ SEM) claw length of hens housed in furnished cages fitted with CSD at different positions. Means within week followed by a different letter are significantly different ( $P \leq 0.05$ ).

**TABLE 1.** Means ( $\pm$  standard error) of central claw length (cm) of laying hens of different ages placed in cages with different types and position of CSD

Age/ week	Device			Position		
	Adhesive stripes	Ceramic plates	Prob	Horizontal	Vertical	Prob
19	1.63 $\pm$ 0.025	1.60 $\pm$ 0.021	NS	1.61 $\pm$ 0.022	1.63 $\pm$ 0.024	NS
35	2.04 $\pm$ 0.078	2.02 $\pm$ 0.073	NS	1.76 $\pm$ 0.042	2.27 $\pm$ 0.053	p=0.0001
49	2.15 $\pm$ 0.106	2.30 $\pm$ 0.133	NS	1.81 $\pm$ 0.079	2.59 $\pm$ 0.075	p=0.0001
62	2.29 $\pm$ 0.124	2.03 $\pm$ 0.120	NS	1.81 $\pm$ 0.126	2.48 $\pm$ 0.074	p=0.0001
78	2.46 $\pm$ 0.127	2.46 $\pm$ 0.172	NS	2.10 $\pm$ 0.113	2.77 $\pm$ 0.134	p=0.001

**CONCLUSION**

The results herein obtained suggest that both CSD types are efficient for shortening hens' claws, especially if placed onto egg baffles. However, when placed in such position they might have a negative impact in the laying hen's welfare by increasing the frequency of toe wounds.

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