



Proceedings of the 1st Mediterranean Regional Meeting of the International Society for Applied Ethnology



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***Proceedings of the 1st Mediterranean Regional
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08:30 Registration

09:30 Opening of the meeting

09:45 Giulio Cozzi: Behaviour, welfare and production of beef cattle

Free Papers

Chair: Giuseppe De Rosa

10:15 Ada Braghieri: The behaviour of confined or free-range Podolian young bulls

10:30 Amélie Legrand: Activities of Compassion in World Farming in the European Union

10:45 Arantxa Villagr : Choice test of nest material in primiparous does. Preliminary results

11:00 Coffee break

11:30 Xavier Boivin: Farms, farmers and handling stress in beef cattle

Free Papers

Chair: Giuseppe De Rosa

12:00 Haifa Benhajali: Genetic relationships between temperament traits of Limousine calves

12:15 Michela Minero: Behaviour of horses competing in the Palio of Siena during training

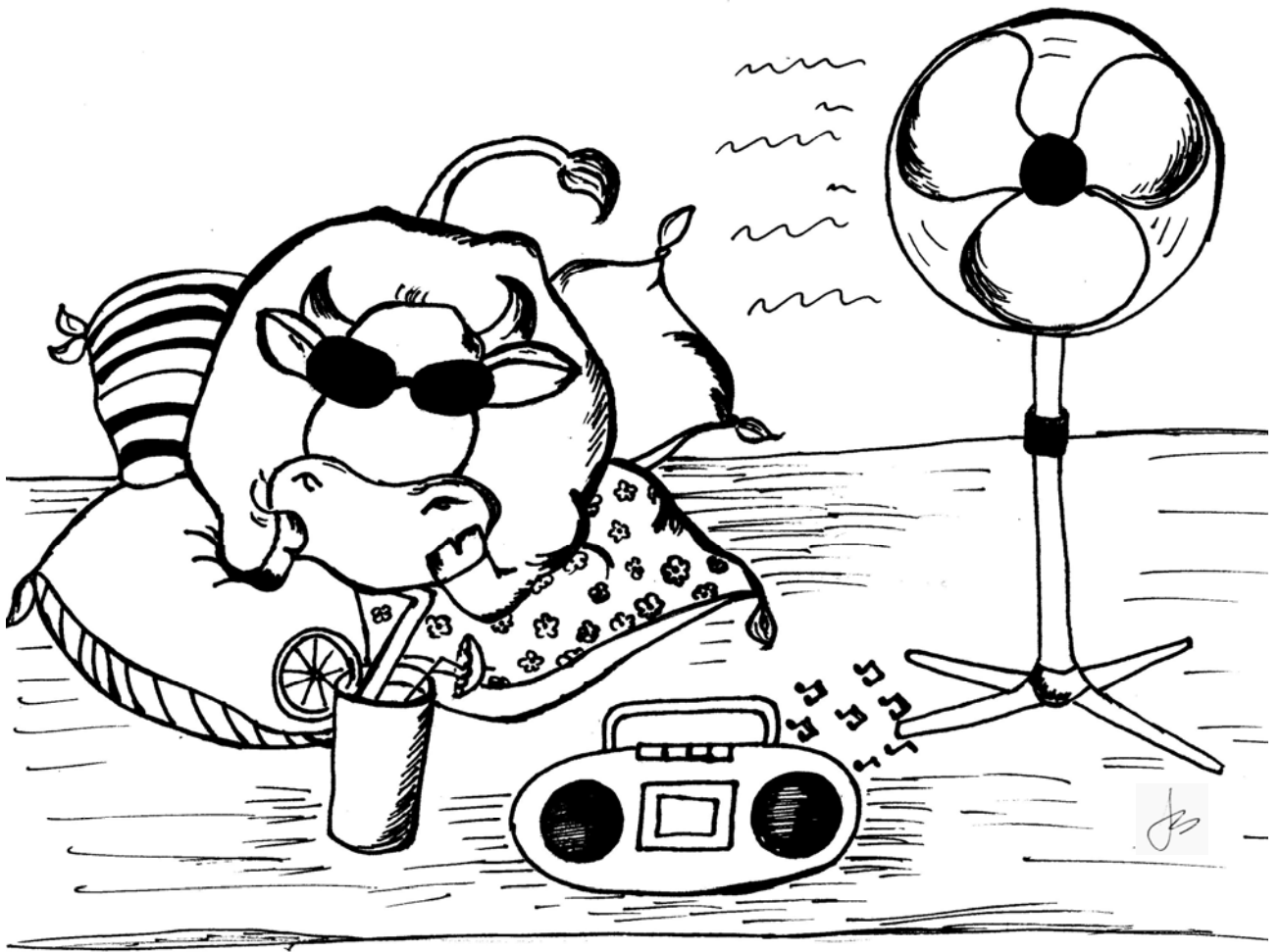
12:30 Adriana De Pasquale: Preliminary study on the influence of management conditions on cytokines levels used as biomarkers of welfare in horses

12:45 Simple lunch

13:30 Poster session

14:00 Vicky Sandilands: Conclusions and plans for the future

Abstracts of plenary talks





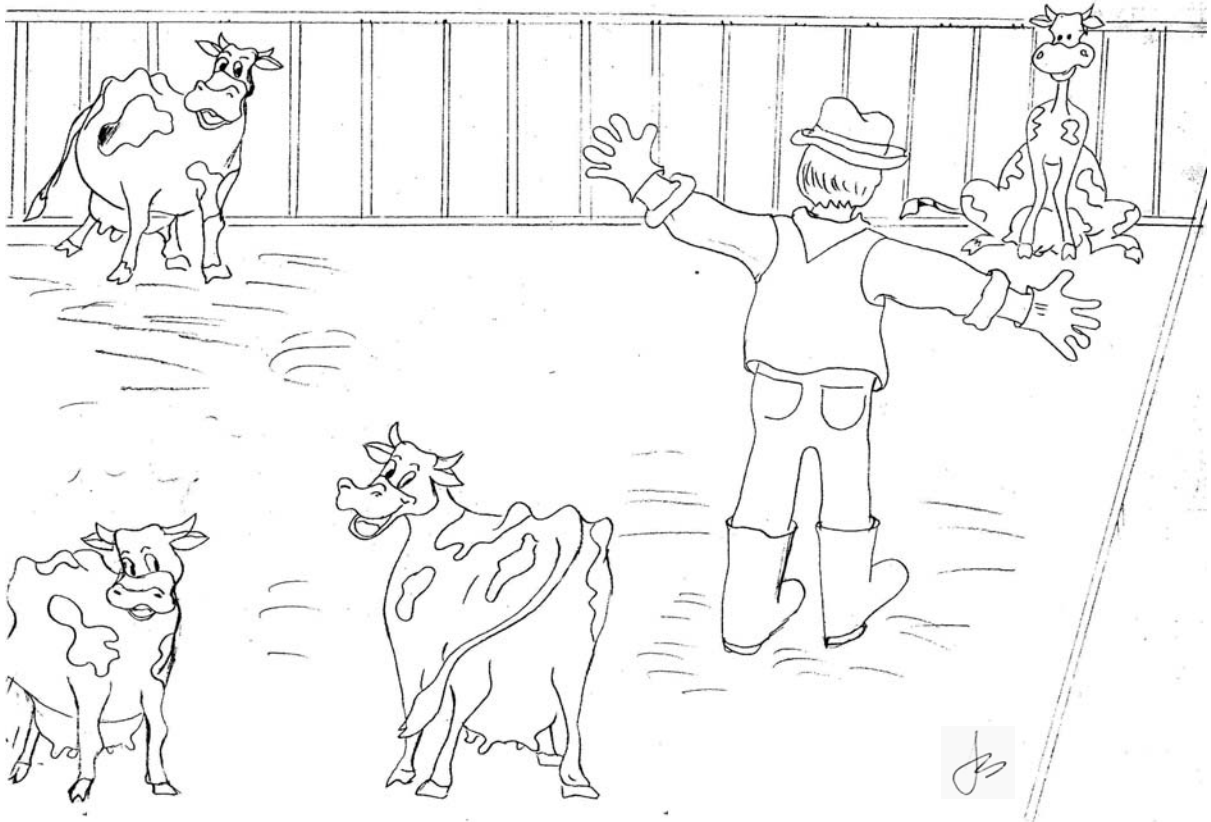
Behaviour, welfare and production of beef cattle

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Italy has a long history and tradition as beef cattle producer and according to the European statistics is the third main contributor (11.4%) to the total cattle meat produced within the 25 EU Countries following France (22.5%) and Germany (15.3%). Beef bulls heifers are by far the main category of cattle raised for meat production in Italy followed by veal calves and culled dairy cows. The rearing system of beef cattle is mainly intensive with a high stocking rate and the loose housing of the animals in multiple pens indoors. Full concrete slatted floor is the most frequent type of housing surface adopted in these beef farms because it does not require any bedding material and it has a lower labour cost to remove slurry. The diets for finishing beef cattle are rich in concentrate feedstuffs and in starch sources in particular, to promote the maximum daily gain. Cattle feeding behaviour under intensive rearing system will be addressed considering the partition of intake during the 24 hours and the possible sorting activity. The limited space allowance is one of the most important risk factors for beef cattle welfare under intensive production systems. Other risk factors related to the housing structures regard type of floor, space at the manger, number of drinkers and lack of dedicated moving and handling facilities. Microclimatic conditions can be critical especially during the summer season when cattle can experience heat stress. The feeding plan may be another factor impairing beef cattle welfare due to the low content of long fibre roughage which increases the risk of metabolic acidosis. A good quality of the stockmanship should protect the animals against parasites and rodents, avoid the regrouping and promote a routine cleaning of housing structures, mangers and drinkers.





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Farms, farmers and handling stress in beef cattle

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Despite millennia of domestication, cattle handling is still perceived by a part of the farmers as dangerous and uneasy husbandry practices. Indeed, too many accidents are still occurring in contact with the animals. Of course size, weight and strength of these animals are strong risk factors. In addition, over-reaction to handling is more and more a major concern and studies largely emphasised an important variability among animals and among farms in animal's responses to human and handling. This question appears even more important in European beef husbandry systems with increasing risk factors such as herd size, changes in housing system, time constraints and decrease in the number of workers' units. In addition many recent studies highlighted in several productions the consequences of poor animal's reaction to human and handling in term of production (growth rate, milk production, fertility, health, meat quality, etc.). So, this presentation will quickly discuss the different factors (handling facilities, social environment, human-animal relationship and handling practices, parental influences) that can induce handling stress. We will also discuss the possible practical solutions that should be proposed to improve cattle handling.

Abstracts of oral presentations



The behaviour of confined or free-range Podolian young bulls

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This study aimed to evaluate the effect of confinement on the behaviour of Podolian young bulls. In one group six animals, aged about 11 months at the start of the experiment, were allowed to graze on a natural fenced pasture (18 ha of grassland, 2 ha of shrub vegetation) until slaughter (group FR). Other six subjects (group C) of the same age were confined in a loose barn with a straw bedded resting area and an uncovered exercise area (13.4 m²/head). Five sessions of behavioural observations were performed from April to mid-June (spring) and four from mid-June to August 2008. During a 6-h period, alternatively conducted from 06.00 to 12.00 and from 12.00 to 18.00, the behaviour of a focal animal was continuously monitored. In each session a different animal was chosen. Data were subjected to ANOVA with season, rearing system and their interactions as factors, using the observation session as experimental unit. For most of the variables no interactions season x rearing system were observed. FR subjects walked longer distances in comparison with C animals ($P<0.05$). This is closely related to the higher walking ($P<0.05$) activity and the lower inactivity ($P<0.01$) observed in FR bulls as compared to group C. These results may be attributed to the fact that grazing animals receive more environmental stimuli for exploration and feeding as well as to a different availability of food resources, as also suggested by the higher feeding ($P<0.001$) and standing ($P<0.01$) activities recorded in group FR. In response to high summer temperature walking ($P<0.001$) and standing ($P<0.05$) were lower, whereas inactivity was higher ($P<0.05$). Group FR showed lower agonistic ($P<0.05$) and non-agonistic ($P<0.01$) interactions as possible consequences of reduced competition for resources (food, water, resting areas, etc.) and increased attention to the environment, respectively. Obviously, higher space allowance and inter-individual distances can have also induced a reduced number of social contacts. Vocalisations were higher in FR animals ($P<0.05$) and in spring ($P<0.05$). Vocal signals are used to keep contact with and locate other herd members, therefore they were more frequently expressed in free-range conditions and when animals moved more (spring). We conclude that confinement markedly affected the behaviour of the animals.



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Activities of Compassion in World Farming in the European Union

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Compassion in World Farming is the leading farm animal welfare organization, working throughout the European Union and worldwide to advance the welfare of farm animals. We campaign peacefully to end cruel factory farming practices and we undertake political lobbying to drive new and progressive regulatory reforms. We provide information to consumers, so that they can make informed choices when buying farm animal products. As progress in animal welfare depends on science, we carry out extensive research and publish high-level scientific reports that are relevant to the food industry, legislators, educators and the media. Over the decades, our work has been extremely successful in improving farm animal welfare. In 1997, animals were legally recognised as sentient beings by the EU, following a ten-year campaign by Compassion. This fundamental agreement now underpins and paves the way for all future improvements to farm animal welfare in Europe. We have also secured landmark agreements to outlaw the barren battery cage for laying hens, veal crates and sow stalls across Europe. In 2005, export subsidies for EU farmers transporting live cattle to the Middle East were eliminated. Compassion continues to fight for a maximum journey time of eight hours to be endorsed by EU Agriculture Ministers. Our Food Business Unit engages positively with the food industry and launched the Good Egg Awards in 2007 – a pioneering European initiative to celebrate leading companies for sourcing only cage-free eggs. Compassion also collaborates with other like-minded organizations and leads the European Coalition for Farm Animals which brings together animal welfare groups from 29 countries. The challenge for the future will be to ensure that animal welfare becomes fundamental within the global food system. Compassion recognizes the interrelatedness between animal welfare, environmental protection, human health and sustainability and aims to embed animal welfare within this wider context.



Choice test of nest material in primiparous does. Preliminary results

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Commercial rabbit production is an important issue in Mediterranean countries, being Spain the third producer of rabbit meat in the European Union, following France and Italy. Rabbit production is mainly developed in wire cages and does are housed individually. Each of these cages is provided with a nest box where the doe gives birth. On the 28th day of doe's pregnancy, the nest box is filled with hay, straw, wood shavings or waste wool and cotton, among some others. In the present study, straw and wood shavings were studied as potential materials for nest boxes, and a choice test was designed for this purpose. Two replicates of 30 primiparous does each of them were carried out, and they were housed 10 days before the parturition in a double commercial cage, so each doe had access to two different nest boxes. One of the nests was filled with 8 cm of barley straw and the other one with 8 cm of wood shavings, so the doe could choose which one to prepare and give birth in. During the 24 hours previous to the parturition, the state of the nest was assessed, according to the mixing of the material and the doe's hair and the conservation of the original material, as well as the chosen nest box. When the does gave birth, the number of alive and dead newborns was recorded. In the first replicate, 87% of the does chose the straw nest box, while in the second replicate, they were 93% of the does. The number of alive pups did not differ statistically, although it was slightly higher when straw was the chosen material (8.36 ± 1.74 vs 6.85 ± 3.44). This difference could be due to the fact that one of the does whose parturition took place in wood shavings, just had one pup and it was born dead. Finally, all the nests achieved a good level of mixing between the original material and the hair of the doe and only 5% of the does removed the original material (regardless it was straw or wood shavings) and made the nest just with her hair. In conclusion, our results suggest that does might have a strong preference for straw rather than wood shavings as nest material, and this choice does not seem to affect the productive results.



Genetic relationships between temperament traits of Limousine calves

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Domestication process is defined for a part as a genetic adaptation of an animal population to human constraints. Genetics bases in early beef calves' responses to human and handling were investigated. Behavioural records during weighing were registered at on average 5 and 8 months of age respectively for 1283 and 1441 Limousin calves, 810 tested twice. They were born in 24 French commercial farms from 128 bulls, with 12 ones balanced among the farms for connection. Calves were individually restrained in the scale for weighing (P1), then exposed to a stationary human situated in front of the scale for 10s (P2). For every calf and each period, the total number of movements (TM) and rush movements (RM) were scored using a 6-point score. In addition, the free reaction of the calves to human presence was assessed once by the technicians during the morphological scoring of animals at 8 month of age using a 6-point score (MS) ranging from 1 (come near) to 5 (rush away) and 6 (charge). Variance components were estimated using Restricted Maximum Likelihood methods. The repeatability of measures taken at 5 and 8 months was about 0.3 for all the traits. Genetic correlation estimates between the TM and RM scores measured at 5 and 8 months (ranging from 0.94 to 0.99) suggest that these traits are governed by the same pool of genes at the two ages. However, higher genetic variability was observed at 8 months with heritability estimates ranging around 0.30 for TM and RM (P1) and around 0.20 for TM, RM (P2) and MS. All the scores were genetically highly correlated (ranging from 0.94 to 0.99) except for MS which was not significantly correlated to the other traits. Genetic traits involved in animal handling are confirmed but their identification should be further explored.



Behaviour of horses competing in the Palio of Siena during training

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The Palio of Siena, a historical horse race held in Italy twice a year, involves acute and intense stimuli that could affect the welfare of competing horses. The Siena municipality set a protocol directed towards the protection of horses that, among other measures, requires the selection of the most suitable subjects and the performance of three compulsory training trials. This study aimed to verify the efficacy of the mandatory training, by testing if unwanted or stress related behaviour decreased over the subsequent training trials and if horses behaved similarly during training and racing. Twenty-four horses competing in the July and August Palio races in 2007 and 2008 entered the study. We video-recorded every training trial and race of the horses and analyzed the hourly frequencies of specific unwanted behaviours (i.e. kicking, head shaking, etc.), using a focal animal continuous recording method. A GLM for repeated measures was used to verify changes in behaviour over time. Among observed behaviours, only “forcing the canape”, that means pushing against the rope tightened across the starting point, decreased significantly ($P < 0.05$) over the training trials. We found no correlation between the behaviour shown by horses during training and the Palio race. This is probably due to a limited habituation process and to the presence of many uncommon variables between the two different environmental settings. Knowledge about horse behaviour and learning ability is the basis for the development of management techniques that meet horses’ requirements, thus limiting stress conditions during the Palio.

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Preliminary study on the influence of management conditions on cytokines levels used as biomarkers of welfare in horses

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The distress effects influence not only the physical state but also the emotional homeostasis through the activation of Hypothalamic-Pituitary-Adrenal axis (HPA), leading to maladaptive effects or chronic stress. Responses to this state indicative of poor welfare include reduction of immune activity, growth, reproduction and sickness behaviour. Such behavioural alterations, together with the haematological variations, are referred to coping strategies actuated by animals during chronic stress conditions. Recently, several studies focused on the role of some cytokines during animal coping strategies, concerning the relation among immunological, haematological and behavioural parameters. The purpose of this preliminary study was to assess the levels of some cytokines in 43 horses stabled in different management typologies: Type 1 (21 subjects) considered suitable, Type 2 (9 subjects) little suitable, Type 3 (13 subjects) not suitable. The expression of IL-1, IL-2, IL-4, IL-6, IL-10, TNF-alpha, IFN-gamma, was investigated by Real Time-PCR test on 7700 sequence detector (Applied Biosystems). The PCR was targeted to a specific DNA sequence inner to cytokine selected genes, and specific primer couples and labelled probes were chosen by primer express software. The reaction mixtures were experimentally optimised for each investigated gene, using QuantiTect Multilex RT-PCR NR kit (Qiagen). The fluorescence signals obtained through every sample, were compared with the relative signal registered for the beta-actin housekeeping gene in the same analytical plate. The Mann Whitney test showed statistically significant differences regarding: IL-1 (Type1 vs Type3 $P < 0.001$; Type3 vs Type2 $P < 0.001$); IL-2 (Type1 vs Type2 $P < 0.001$; Type1 vs Type3 $P < 0.002$); IL-6 (Type1 vs Type2 $P < 0.02$; Type1 vs Type3 $P < 0.001$; Type3 vs Type2 $P < 0.001$); IL-10 (Type1 vs Type2 $P < 0.02$; Type2 vs Type3 $P < 0.01$); TNF-alpha (Type1 vs Type2 $P < 0.001$; Type1 vs Type3 $P < 0.001$; Type3 vs Type2 $P < 0.001$). The obtained data show as management conditions could play an important role on genic expression levels of horse's cytokines.

Abstracts of poster presentations



Lesions evaluation in groups of sows fed with an electronic feeding system

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According to the Dir. 2001/88/CE and 2001/93/CE, pregnant sows must be kept in groups, thus being able to better fulfill their behavioural needs. Welfare problems may however arise as a consequence of aggressive interactions for space or feed competition. This study aimed to evaluate the location, the characteristics and the onset of lesions in groups of pregnant sows fed with an electronic feeding system. During two observational periods, summer and winter 2007, lesions of 178 pregnant sows were evaluated twice, at the entrance in the pen and at the exit before farrowing. Observational data were reported on a data base, frequencies and proportional frequencies of the lesions were calculated. Chi-square test was used to compare summer to winter observations. 67% of the animals had no vulva lesions at the exit before farrowing. More subjects showed recent vulva lesions during the winter period than during summer (29% vs 15%, $p < 0.05$). Vulva biting is mainly associated with aggressions due to feed competition. Therefore, one possible explanation for our results is that sows suffered greater feed restriction during winter because of lower temperature and increased metabolic rate. More sows presented body lesions during the summer period (32% vs 13%, $p < 0.05$) probably because high temperatures increase the competition for cool places where to lie down. In conclusion, we found a relatively low number of lesions, which were superficial and mainly located at the vulva during winter and at different body regions during the summer.

The Authors thank the staff of Az. Agr. La Panizzina s.r.l. for help with on farm recording. This work was funded by Italian Ministry of Education, University and Research (PRIN 05-07).



Are abnormal behaviours still a problem when veal calves are provided with high amounts of solid feeds?

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Nutritional and ethological deprivation are still a central issue for veal calves' welfare in intensive rearing. Beneficial changes occurred with the coming in force of a specific legislation for calves protection that imposed the addition of a minimum daily ration of solid feed (50-250 g/head) to the all-liquid diet, however no specific suggestion on fibrous sources' type is present. It was aim of the present study therefore to assess the incidence of abnormal behaviours in 50 Polish Friesian calves fed amounts above the legal requirements of two solid diets with different fibre content: *Maize grain* (NDF 10.6±0.34 %DM) and a *Mix* diet (NDF 19.1±1.29 %DM). Behaviours were observed 1 h before and 1 h after each of the 2 daily feed distributions at days 25, 61, 110 and 167 of trial. The number of calves/pen performing stereotypes (tongue playing and rolling), orally manipulating or sniffing a substrate, and urine drinking/cross-sucking prepuce of a pen-mate were recorded with 5-min-interval scan sampling. Data were expressed as min/h and they were statistically processed considering the diet, age and diet*age effects. Interaction was never significant. Regardless of the diet, calves performed stereotypes with a low frequency, decreasing gradually from 2.1 min/h at day-25 to 1 min/h at day-167 (P<0.05). The significant age effect on the reduction of time spent performing all abnormal activities after day-25, associated to the increasing roughage quantity, underlines the importance of high amounts of solids provided to calves (176.5 kg/head/cycle). Lower time spent orally manipulating or sniffing a surface (13.3 vs. 10.5 min/h, P<0.05) by the calves fed the *Mix* diet compared to those receiving *Maize grain* support the hypothesis that provision of feeds rich in fibre reduces signs of nutritional and ethological deprivation. Problems are evidently reduced using high quantities of solid feeds and in particular when highly fibrous.



Influence of space allowance and housing conditions on the welfare and production performance of dairy ewes

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The experiment involved 45 Comisana ewes, divided into 3 groups of 15. The aim was to determine the effects of 2 different stocking densities and 2 different housing conditions on welfare, and on production performance of dairy ewes. The stocking densities tested were: high stocking density (1.5 m²/ewe, HD group) and low stocking density (3 m²/ewe, LD group); the 2 housing conditions tested were: ewes housed indoor (LD group) and ewes allowed to use an outdoor area (LDP group, 3 m²/ewe divided in 1.5 m²/ewe indoor and 1.5 m²/ewe outdoor). At the beginning of the experiment, and then every 2 months, the cell mediated immune status of sheep was evaluated. One month after the beginning of the experiment, and 20 d later, the ewes were injected with chicken egg albumin (OVA) to assess their humoral immune responses. Monthly behavioral activities of ewes were monitored using 15-min scans. After lamb weaning, milk yield from individual ewes of the 3 experimental groups was measured and milk composition analyzed weekly. Housing condition affected cell mediated response, which was higher in LDP than in LD ewes ($P<0.001$). Concentrations of anti-OVA IgG were mainly influenced by space allowance, with higher antibody titers in LD than in HD ewes throughout the experiment ($P<0.001$). Both housing conditions and space allowance affected sheep behavioral activities; a greater proportion of LDP ewes displayed standing and drinking behaviors than LD ewes ($P<0.001$ and $P<0.01$, respectively), and a greater proportion of LD ewes was observed walking than HD ewes ($P<0.01$). Ewes allowed to access the outdoor area had a higher protein content ($P<0.05$) and lower somatic cell count in their milk ($P<0.05$), whereas reduced space allowance led to a reduction in milk yield and an increase in somatic cell count of milk ($P<0.05$). Results indicate that both increased space allowance and availability of outdoor area can improve the welfare and production performance of the lactating ewe.



Gentling: effects on welfare of artificially reared lamb and human-lamb interactions

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A 7-week trial was performed to assess the effects of gently handling newborn lambs on their well-being measured in terms of behavioural, immune and endocrine responses when mothered or artificially reared. Sixty-four lambs were involved in the study, which were divided in four groups of 16 each and housed in 3m x 8m straw bedded pens. Two groups were kept with their mother throughout the experiment; one group was subjected to gentle handling for 5 minutes once a day (ER+G) and the other not (ER). Two groups were separated from their dams 24 to 30 hours after parturition and offered a milk substitute; one group received gentle handling (AR+G) and the other not (AR). Behavioural activities of lambs were monitored using scan sampling procedures. Lambs were tested for their responses to two stationary human tests and to isolation in a novel environment. Blood samples were taken from lambs immediately before the isolation test, soon after the test and 60 min after to evaluate their cortisol response. The cell-mediated and the humoral immune responses were also measured. More AR+G and AR lambs were observed investigating ($P<0.01$) and more often were found playing ($P<0.10$) with object than ER lambs. When isolated in a novel environment the ER+G lambs displayed higher ($P=0.07$) averages plasma cortisol levels than the AR+G animals at 15 days of age. No differences in cell-mediated immune response were observed among groups, whereas the AR lambs displayed antibody titres lower than the ER and AR+G lambs throughout the trial and than the ER+G animals at 45 days of age. Results suggest that gentling may be properly used in artificial rearing programs of lambs, because it can reduce the risk of lamb disease, by sustaining the lamb immune function, and minimize the stressfulness of management practices involving lamb manipulation. Our findings also confirm that cares of stockmen have no beneficial effects on dam-suckled lambs.



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Effect of hay allowance on growth of buffalo calves

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A study was conducted in order to evaluate the effects of dietary treatment (commercial starter concentrate *vs* commercial starter concentrate with free access to ryegrass hay) on faecal score, dry matter intake (DMI), body weight (BW) and *in vivo* digestibility in buffalo calves. Twenty-four buffalo calves (4 male, 20 female; 12 calves per treatment) kept in individual calf cages were started on the experiment at 10 d of age and for 12 weeks. Faecal scoring was assessed twice weekly, and DMI was measured weekly. BW gain was recorded every two weeks. At the end of the experimental period, on a subset of 10 calves (5 per treatment), nutrient *in vivo* digestibility was measured by using acid-insoluble ash as internal indigestibility marker. The growth curves showed a good fit to a linear regression model (on average $R^2=0.89$; $a= 43.8$; $b=0.525$). Calves that were provided with hay consumed less starter (524 *vs* 421 g/d; $P<0.001$) compared to those fed exclusively with starter; total DMI was higher (1313 *vs* 1443 g/d; $P<0.001$) in hay supplemented group. Despite of this, however, final BW, total BW gain, average daily gain of calves receiving hay were comparable to that observed in unsupplemented animals. No differences were observed for faecal consistency among the two treatments. Hay supplementation depressed the digestibility coefficients of dry matter, organic matter and crude protein ($P<0.001$), while it increased those of NDF and hemicellulose ($P<0.001$). We concluded that hay allowance during milk feeding period of buffalo calves allows to achieve the same growth performance as animal consuming commercial starter alone.



Ethogram, reactivity and performance in the *Brianzolo* chickens

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Unconventional rearing systems for poultry meat production have been greatly increased due to the consumers interest in healthier and more natural food. *Brianzolo* is an example of Italian chicken breed for unconventional system. The aim of this study was to investigate the production, the ethogram and the reactivity of this breed to predict their adaptability to alternative rearing condition.

Thirty *Brianzolo* pullets were reared (indoor and outdoor) from hatching to 190 days. All the animals were weighted eight times during the rearing period. Tonic Immobility tests were performed at week 3, 8, 12, 16, 20 to evaluate adaptation level and fearfulness. Throughout the rearing period, behaviour was observed 9 times in the morning and in the afternoon. The means and the SE were calculated to estimate performance. Tonic Immobility results were analyzed by using Kruskal-Wallis test. The observed frequency of each behavioural category (feeding, exploration, comfort, resting, movement and social interaction) were calculated.

The mean final weight of this breed was 1980 g, and the average daily gain was 71 g. The dressing percentage was 76%. These results may indicate a slow growing attitude of this breed. Males showed more frequent aggressive behaviour than female (fight 12.1% vs. 5.9%; feather pecking 2.1% vs. 0.6%). On the contrary, females showed more frequent escape behaviour (8.8% vs. 4.7%). The number of attempts to induce immobility increased from the 3rd to the 20th week of age (1.43±0.68 vs. 2.63±0.61; P<0.001). On the contrary, the TI duration decreased (112.7±67.7 sec vs. 60.3±75.6 sec; P<0.05). In conclusion, the *Brianzolo* breed showed acceptable performance compared to other rural breeds adapted to alternative production systems. Furthermore, this breed showed a quite normal ethogram and the conservation of ancestral characteristics such as man fear.

The Authors thank Mr Marco Legramanti and the staff of “Cascina NIBAI” for help and cooperation during data recording.



Influence of management conditions on the diurnal ethogram of different thoroughbred foals

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The aim of this study was to verify the influence of management conditions on the diurnal ethogram of different thoroughbred foals. A purebred Spanish horse (foal A) and a purebred Oriental horse (foal B) were considered. They were both female and aged one week. The foal A lived in an open-air paddock and belonged to a group of five mares and two foals. The foal B lived with a mare in a box with access to an external paddock, in a stable where six couples horses lived in the same conditions. Foals' behaviours were recorded for six hours to be studied using the "focal animal" technique. Ethograms have been divided into six intervals of an hour. Statistical analysis has been performed by means of Spearman's Test and Friedman's Test. Foal A spent 2h10'39" on standing alert, 00'15" on standing relaxed, 1h46'00" on sternocostal recumbency, 42'54" on lateral recumbency, on walking 34'00", 43'10" on suckling, 2'17" on grooming, 4'27" on autogrooming, 46'18" on investigating, 05'59" on olfactive communication, 04'01" on playing. The foal B spent 1h43'23" on standing alert, 13'21" on standing relaxed, 1h39'26" on sternocostal recumbency, 1h22'50" on lateral recumbency, 23'17" on walking, 26'02" on suckling, 7'11" on autogrooming, 47'52" on investigating, 02'53" on olfactive communication, 03'26" on playing. No time-correlation was showed by any behaviour. We found significant differences concerning lateral recumbency ($P < 0.05$) and suckling ($P < 0.01$). Lateral recumbency is an expression of calm; as a consequence, the time spent by foal B in this posture probably expressed a greater adaptation to management conditions. On the other hand, the total duration and higher frequency of suckling activity of the foal A showed the integrity of survival strategies, which are proper of equids.



Procedures for analyses of sequence of thermal images in welfare study of rabbit

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Among the main physiological stress indicators, the evaluation of body surface temperature is very important, since it can be measured without directly interacting with the animal by using infrared thermography. In fact, the main challenge when measuring body and skin temperatures is to assess them without inducing other stress reactions due to handling. Over three years, the trials showed that skin temperature differences between stressed and non-stressed rabbits ranged between 0.5 and 1 °C. Our analysis included thermographic data management and surface area selection for temperature measurements.

To avoid any stress due to human presence during the shooting in no-stressed condition (basal) thermographic measurements were performed remotely, allowing the rabbit to move freely in an open cage.

In rabbits, the best location to check stress was the ear skin, due the vasoconstriction process, as showed by other authors.

We compared three methods for the analysis of thermographic images and also for the statistical analysis of thermographic data. The main technical points to develop were: to follow the hot spot during rabbit's movement (tracking function), to perform a separate analysis for different body's areas and to distinguish body's thermographic signals from thermal interferences.



A preliminary comparison between behavioural response to the Backtest and to the Tonic Immobility Test in piglets

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In attempting to identify individual reaction patterns in pigs, the Backtest (BT) and a response to the Tonic Immobility Test (TIT) have been used. BT and TIT allow to classify piglets in different type of "coping style" ("high-resisting" (HR) and "low-resisting" (LR) by the BT; "NON-TI" and "TI" by the TIT) on account of their reaction to restrain situation.

HR pigs seem to adopt a (pro)active coping style while LR pigs seem to behave as passive (or reactive) copers. Likewise, it has been proposed that TIT is one possible way of assessing whether individual pigs are more likely to adopt a more active or a more passive behavioural strategy in a challenging situation. There are no data concerning the possible link between the tonic immobility and response to the Backtest in piglets; the aim of this study was to investigate this potential relationship. Sixty piglets from 10 litters of commercial crossbred pigs (Landrace x Large White) were tested. The Backtest was performed at 10 and 17 days of age; the Tonic Immobility Test was performed before (20 piglets), between (20 piglets) and after (20 piglets) the Backtest. The sequence of the tests did not influence their results (BT: $\chi^2=3.61$ d.f.=2 n=45 P=0.16; TI: $\chi^2=1.08$ d.f.=2 n=58 P=0.58). In the Backtest the duration of vocalization (U=150, n1=22, n2=23, P=0.02), struggling (U=35, n1=22, n2=23, P=0.0001), and relaxation (U=31, n1=22, n2=23, P=0.005) was significantly different between HR and LR piglets validating the methodology. Due to the TIT methodology the duration of struggling, relaxation and vocalizations were not analysed. There was no relationship between Backtest scores and susceptibility to immobility ($\chi^2=1.14$ d.f.=1 n=45 P=0.29). This result suggests that the two tests measure the reactions of pigs to different challenging stimuli and they may be seen as indicators of different types of response.

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The effect of different environmental lighting programs on some production and behavioural traits of Italian heavy pigs

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The following trials have been carried out in order to study the effect of different lighting regimes (duration and intensity) on some production and behavioural traits of Italian heavy pigs, i.e. pigs slaughtered at around 160 kg BW and intended for Italian PDOs' hams production.

In the first trial, lasting 135 d, the differences arising from two different lighting intensity programs (40 vs. 80 lux over a 12h/d period) were investigated on 40 pigs (initial BW 75 kg) with respect to growth parameters, general behaviour (by scan sampling) and social interactions (by all occurrences sampling). No significant differences were observed either for growth parameters or general behavioural traits. The number of daily agonistic interactions was significantly reduced among pigs receiving the higher lighting intensity (18.2 % vs. 11.4 %; $P < 0.05$).

In a second trial, lasting 86 d, 56 pigs (initial BW 112 kg) were subjected to two different light-time durations (14 h vs. 8 h of light/d with a light intensity of 70 lux). The same data as above were collected. Pigs receiving the longer photoperiod grew better ($P < 0.01$ for ADG and FCR) and spent significantly ($P < 0.01$) more time resting in lateral and sternal recumbency (84.9% vs. 80.77%). Although not significant, a reduction of agonistic interactions was also observed.

According to SVC (1997) and EFSA (2007) reports, our data confirm that pigs have a specific requirement in terms of duration and intensity of environmental lighting with favourable outcomes when the light intensity (80 lux) and the light-time duration (14 h light/d) were higher than the minimal levels recommended by current EU legislation (40 lux over a 8 h/d period; EC, 2001).



Time budget and avoidance distance of lactating buffaloes

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The aim of this study was to provide information on time budget of Italian Mediterranean lactating buffalo. The study was carried out in three loose housed farms with outdoor paddocks. For each farm two sessions of observation were performed at two-week intervals. The observations were performed in the morning starting 1 hour after the administration of a total mixed ration. Avoidance distance at manger was evaluated before starting observations. An herd scan was performed at beginning of observation session in order to detect the number of feeding animals. Subsequently, during a 6-h period the behaviour of focal animals was continuously monitored. After each hour of observation the focal animal was changed, thus six focal animals were observed. The behaviours recorded were posture and activity. The percentage of time spent on each behaviour were calculated for each observation session. Behaviours such as agonistic and social interactions were recorded as number of events. Due to the limited number of recordings no statistical analyses were performed and data were expressed as mean and standard deviation of the two observation sessions. Avoidance distances at manger were 0.47 ± 0.11 , 0.26 ± 0.01 and 0.37 ± 0.16 m for farms 1, 2 and 3, respectively. Feeding synchronisation 1 h after feed administration was satisfactory in farm 2 (82.5 ± 9.37 %), whereas it was lower in farms 1 and 3 (55.0 ± 9.9 and 58.4 ± 4.0 %, respectively). Standing was the main posture for farm 1 and 3 (77.2 ± 7.1 and 60.0 ± 5.3 %, respectively), whereas in farm 2 lying down was more frequently expressed (61.1 ± 17.9 %). Buffaloes performed ruminating more often while lying in farms 2 and 3 (41.8 ± 5.8 and 18.6 ± 5.8 % for farms 2 and 3, respectively) than standing (2.1 ± 0.7 and 7.6 ± 6.9 % for farms 2 and 3, respectively), whereas the opposite was found in farm 1 (12.1 ± 17.1 and 25.8 ± 2.4 % for lying and standing, respectively). Agonistic interactions (n of events/animal/hour) were 0.2 ± 0.4 , 0.2 ± 0.1 and 0.7 ± 0.5 for farms 1, 2 and 3, respectively. Social interactions were more frequently expressed being 1.3 ± 1.7 , 1.8 ± 1.3 and 2.4 ± 1.3 for farms 1, 2 and 3, respectively. The data showed that the animal activities differed among farms as possibly affected by management practices and farm layout.

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Behaviour of buffalo heifers kept in extensive conditions and farming sustainability

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The behaviour of 16 free-ranging buffalo heifers was studied and the sustainability of their farming assessed. The experiment was conducted from February to October 2006 on a fenced pasture of ~40 ha located in Salerno province, SW Italy. Approximately 10% of this area was covered by woodland and shrub vegetation. The rest of the fenced area was occupied by grassy habitat (660 kg biomass/hectare, grass 43%, legumes 18%, compositae 18%, other families 21%). Behavioural data were collected through continuous focal animal sampling from April to October. During a 6-h period (between 05.30 and 15.00 hours) the behaviour of a focal animal chosen at random was continuously monitored. During the behavioural observations the ingestion of woody or shrub vegetations was rarely observed, whereas the proportion of times the animals were observed grazing (0.548, 0.408, and 0.433 ± 0.068 for spring, summer and autumn, respectively) and lying in the mud (0.230, 0.432 and 0.248 ± 0.085 for spring, summer and autumn, respectively) were high in all seasons. In terms of inputs, in 274 days the animals required 8921.92 ± 416.47 Mcal, 1554.79 ± 79 forage units and 261.07 ± 14.32 kg of gross energy, net energy and crude protein, respectively. As to outputs, heifers showed a weight gain of 104.53 ± 6.04 kg. A low cultural energy input was required in terms of labour and machinery, whereas fertilizers, pesticides, seeds and irrigation were not used. The results indicated that the free-range system allowed the expression of species-specific behaviours, such as wallowing and grazing, while reducing input requirements and risks of environmental pollution.



Hen grooming as a function of louse infestation and beak condition

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Because of its importance as an animal welfare issue, beak trimming has been the subject of many studies. However, none of these have assessed the effects of trimming on ectoparasite loads, even though beak-related grooming is probably an important means of removing such parasites. The aim of this study was to investigate the effect of louse infestation on the grooming behavior of hens that were either beak trimmed (BT) or not trimmed (NBT). Hyline CV20 (W36) hens were observed; 16 hens were used as an uninfested control and 16 were experimentally infested with the body louse *Menacanthus stramineus*; 8 hens per treatment group were BT and 8 were NBT. The hens from each treatment group were arranged in two separate but identical poultry houses, and were housed two per cage. At 20 weeks of age, the hens were experimentally infested with the lice. They were then videotaped for two 20-minute sessions per day 9 weeks later, at which time there was a high rate of infestation. The amount of time spent grooming (preening or manipulating the feathers with the beak) and the number of grooming bouts were measured using focal animal sampling. A two-way between-subjects ANOVA revealed a significant main effect of treatment. Hens infested with lice groomed more than controls ($F_{1,12} = 9.23$, $p = 0.01$), and also showed a trend to engage in more grooming bouts than controls. There was also a significant interaction between trimming and treatment ($F_{1,16} = 11.56$, $p = 0.004$). Post hoc tests revealed that BT infested hens groomed the most, and significantly more than the NBT control hens ($P < 0.001$); there was no significant difference between infested and control NBT hens. The same trend was observed for grooming bouts. However, louse counts at 9 weeks post-infestation were nearly three times higher in BT than NBT hens. Together, these data suggest that beak-intact hens can better modulate their own ectoparasite populations through effective grooming behavior. Although these results are still preliminary, they may have important implications for hen housing systems in which beak-trimming is essential in order to control feather pecking and cannibalism.

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