tivity of each subject was assessed in 2 approach–avoidance conflict tests by pairing food with a stressful stimulus (*ie* the novelty of the environment in the 1st test, a surprise effect in the 2nd test). In both tests, heifers tested with a stressed partner exhibited more signs of disturbance. For instance, in response to the novel environment, they had longer latencies to approach the food and to eat than subjects tested in the presence of a calm partner (respectively: 60 ± 31 s *vs* 15 ± 12 s; $U = 11.5$; $P < 0.05$).

If the mere presence of conspecifics can enable domestic animals to cope with stressful events, our results show that a high degree of stress in conspecifics alters this social buffering effect by increasing levels of reactivity in naive heifers. The stressed partner may have influenced the subjects' behaviour by chemical or vocal communication as has been demonstrated in pigs, sheep and goats. The social communication of stress may have important implications for modern agricultural management and can be detrimental for production and reproduction. It should therefore be taken into account to improve productivity and animal welfare.

Steppic rangeland and rainfed pasture improvement on the Crau: utilization by Merinos d'Arles ewes. T Adama, P Lapeyronie, D Hubert, G Molenat *(INRA-ENSA Unité de Zootechnie Méditerranéenne, place Viala, 34000 Montpellier, France)*

Increased quantity and quality of spring forages can be considered as a major improvement for extensive Mediterranean sheep husbandary systems. It can be achieved by use of annual legumes either sown in temporary pastures or overseeded on rangelands.

The experiment involved 3 types of vegetation: native steppic rangeland of Crau (NR); improved steppic rangeland overseeded with subterranean clover (IR); and a plot cultivated with subterranean clover (SC). IR and SC were fertilized with P_2O_5 (to ensure normal clover development).

From March to June, over 84 d, 11 plots of NR, 11 plots of IR and 6 plots of SC were rotationally grazed by 3 groups of 20 ewes (1 group being assigned to 1 type of vegetation). Each plot was grazed for 4 d. Plot size was adjusted to provide 3.2, 3.0 and 1.8 kg DM/ewe/d for NR, IR and SC. Based on previous experience, 40% of the biomass on NR and IR was considered to be non-edible. Thus the edible DM/ewe/d was 1.8 kg for each treatment.

The total number of ewe days (ED/ha) were 800, 1 100 and 4 000 respectively on NR, IR and SC. The quantities of biomass 'consumed' per ewe per day (estimated by clipping on each plot before and after grazing) were 111 (NR), 105 (IR) and 76 (SC) g/kg $W^{0.75}$. The utilisation rate of the total biomass were 60, 60 and 74% for NR, IR and SC. Ingestion and rumination time, calculated on the basis of jaw movement (INRA recorders), varied according to the vegetation type: 33, 40, 33% of the total daily time for ingestion and 26, 25, 20% for rumination for NR, IR and SC respectively. The body weight increased by 4.5, 4.5 and 6.0 kg and body condition score increased by 0.2, 0.4 and 0.6 points for NR, IR and SC, respectively. The ewes were recovering their body reserves in preparation for spring mating.

This study has made it possible to obtain figures on the productivity of these pastures. Utilization rates of the biomass agree favourably with the obtained levels of animals performance. The higher ED/ha and body condition score obtained on IR and SC compared to NR pastures clearly demonstrate the effect of pasture improvement due to SC overseeding.

The effects of outdoor wintering on the variations in weight and body condition of dry pregnant Salers cows. J Agabriel, M Petit, J Lassalas, E Tannous *(INRA-Theix, Laboratoire Adaptation des Herbivores aux Milieux, 63122 Saint-Genès-Champanelle, France)*

In these experiments we investigated the effect of outdoor wintering on body energy mobilization (live weight and body condition) in order to simplify the management of pregnant dry cows calving in June in semi-mountainous (1 100 m) areas.

Three groups of 18 Salers cows, 4–7-months pregnant, outwintered in 3-hectar paddocks from mid-November to March during winter 1992 (O1), or winter 1993 (O2 and O3). They were fed with cocksfoot hay in limited quantities, 8.6 (O1), 8.7 (O2) and 10.9 (O3) kg of DM per day, distributed in racks where each cow got 1 place. These quantities correspond to an energy supply of 5.8, 5.4 and 6.7 UFL/d, which represent 1.3, 0.9 and

2.2 UFL more than theoretical maintenance requirements. Two other groups paired with O1 were housed in tying stalls the first year (I1 and I2), and only 1 group (I3) the second year. The food supplies to I1 and I3 were similar to those of O1 and O2; those of I2 were adjusted so that its weight and body condition variations were the same as those of O1.

Controlled feeding lasted for 112 (year 1) and 138 d (year 2). Mean temperatures were the same both years, 2 and 3°C outside, and 8°C higher inside. During 8 and 10 d in years 1 and 2 respectively the average outside temperature was less than –5°C. Body weight was measured each week, body condition score (BCS on a 0–5 scale) once a month, and the diameter of the adipocytes (DAC) of the sub-cutaneous adipose tissue was measured at the beginning and the end of the experiments.

Initial maternal mean weight of cows (body weight corrected for foetus and uterus content) was 560 kg (year 1) and 609 kg (year 2). Initial body condition was mediocre (BCS = 2.1, DAC = 68 µ), with no difference between years. During the experimental period indoor groups (I1 and I3) gained 40 and 13 kg corrected weight, 0.4 and 0 points BCS, +14 and –7 µ DAC respectively, whereas outdoor groups (O1 and O2) gained +17 and –44 kg, +0.2 and –0.9 points BCS, +1 and –28 µ DAC. Calculated by regression on the 6 groups, outwintering entailed a supplementary loss of 300 g/d maternal weight, and induced a difference over the experimental period of 0.8 points BCS and 19 µ DAC, which correspond to 20–25 kg of more mobilised lipids. Conversely, an increase of 1 UFL/d in energy supply made up for outwintering cows.

Pâturage d'hiver des prés de Crau : compositions chimique et botanique. Incidences sur la production de la prairie. P Bosc [1], D Hubert [2] *([1] INRA-ENSA, unité de zootechnie méditerranéenne ; [2] INRA, unité SAD/LECSA, place Viala, 34000 Montpellier, France)*

Le système d'élevage ovin en Crau repose principalement sur 3 grandes ressources pâturées : les parcours, la montagne, les regains des prés de fauche irrigués. Ces derniers, qui correspondent à une repousse de septembre et octobre, sont pâturés pendant la phase d'allaitement des brebis, d'octobre à février. Ce sont donc des stocks sur pied dont la qualité diminue au cours de l'hiver. L'étude présentée se décompose en 2 parties : i) connaissance des évolutions qualitatives (compositions botanique et chimique) et quantitatives de ce stock au cours de l'hiver (1991-1992); ii) conséquences pluriannuelles de 3 modes de pâturage hivernaux sur les productions ultérieures (3 coupes de foin et 1 regain). Au cours de l'hiver la teneur en matières azotées totales du regain diminue (18,3% en octobre, 14,5% en février), la teneur en cellulose brute variant entre 23,0 et 27,0%. Une diminution de la digestibilité du fourrage est donc prévisible au cours de la saison. Ces données sont à mettre en relation avec l'évolution de la composition botanique du fourrage offert : baisse des Légumineuses (12 à 6%) et des Composées (16 à 1%), augmentation des Graminées (51 à 85%), augmentation des organes sénescents (10 à 53%). En octobre, le stock disponible est de 2 600 kg MS/ha. La perte de matière sèche se situe entre 4 et 15% selon les conditions climatiques ; la sénescence évolue de 10 à 50%, compensée par une croissance hivernale comprise entre 500 et 1 000 kg MS/ha. Pour analyser les effets du pâturage hivernal sur la production ultérieure, 3 époques de pâturage ont été testées : novembre, février, novembre et février. Après 2 années d'observations sur la production de la prairie de fauche, aucune différence, quantitative ou floristique (hiérarchie des espèces), n'est observée entre traitements. Le fromental et le dactyle dominent dans la 1re coupe (70%) et aussi en 2e coupe (50%), mais avec une contribution plus importante des Légumineuses (20 à 30%) ; à la 3e coupe, le trèfle blanc et le pissenlit atteignent 15 et 10% et le dactyle régresse (12%), le fromental restant dominant (30%). Des changements pourraient intervenir à plus long terme.

Effect of body condition score, concentrate level and protein supplementation on ammonia-treated straw intake by early lactating ewes. C Castrillo, C Rubio, C Dapoza, M Fondevila, A de Vega *(Departamento de Producción Animal y Ciencia de los Alimentos, Facultad de Veterinaria, Universidad de Zaragoza, Miguel Servet, 177, 50013 Zaragoza, Spain)*

The effect of level of concentrate and fishmeal supplementation on straw intake during lactation was studied in 2 experiments with individually fed