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Effect of two levels of supplementary feeding and two stocking rates of grazing ostriches on irrigated lucerne dry matter intake and production

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Abstract

This study determined the effect of two stocking rates of ostriches (10 and 15 birds/ha) and two levels of supplementary feeding (0 and 800 g/bird/day) on the intake and production of irrigated lucerne pastures over a period of five months (January to May). A lucerne pasture was divided into 16 paddocks of approximately 0.85 ha each. One hundred and seventy ostriches (± 6 months old) were randomly allocated to four groups and four different lucerne paddocks were randomly allocated to each group. Each ostrich group rotationally grazed the four lucerne paddocks and was moved to a new paddock every two weeks or as soon as pasture became depleted. The available pasture dry matter was determined by cutting and collecting a 0.166 sq m size sample to ground level inside and outside exclosure cages placed inside each paddock every time the ostriches left a paddock. Pasture material were washed to remove soil and dirt and dried to a constant dry mass at 59 °C. The data was analyzed with analysis of variance, using the four paddocks as replicates and with two treatments and two treatment levels. For lucerne intake a significant interaction was found between level of supplementary feeding and month. Intake was not significantly influenced by supplementary feeding during January, February, March and April, but during May lucerne dry matter intake was significantly higher at 0 g/bird/day than at 800 g/bird/day. This seems to indicate an increasing level of replacement of grazed lucerne dry matter by supplementary feeding as the trial progressed. This is supported by the fact that there tended to be an interaction between stocking rate and level of supplementary feeding in terms of lucerne dry matter intake. This resulted in lucerne dry matter intake being higher at 15 birds/ha than at 10 birds/ha at 0 g supplementary feeding/bird/day, while at 800 g supplementary feeding/bird/day there was no difference in lucerne dry matter intake. In the case of lucerne dry matter production a significant interaction was found between stocking rate and month. During January, February and March lucerne dry matter production was significantly higher at the 15 birds/ha stocking rate than at 10 birds/ha, while there was no difference in April and lucerne production was significantly higher at 10 than at 15 birds/ha in May. The high stocking rate of 15 birds/ha therefore seems to have had a gradual depressing effect on lucerne dry matter production. The less severe levels of defoliation at the low stocking rate possibly promoted lucerne dry matter production. It can be concluded that stocking rate, as well as level of supplementary feeding, influenced lucerne dry matter intake, but only stocking rate influenced lucerne production. Supplementary feeding depressed lucerne intake only at the high stocking rate.

Keywords: Grazing ostriches, lucerne production, lucerne intake, supplementation
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Introduction

Supplementary feeding will only provide an economic advantage when it leads to an increase in the pasture dry matter intake or an increase in the efficiency of utilization of the digested nutrients (Allden, 1981). In previous studies done on grazing finishing ostriches, it was found that the level of supplementary feeding supplied to grazing ostriches had an effect on the production of the finishing ostriches, as well as on the pasture production and availability. Strydom *et al.* (2007) found that ostriches grazing irrigated lucerne pasture and received supplementary feed balanced according to the nutrient value of the lucerne and the requirements of the animals, grew faster than ostriches which only had access to lucerne grazing and received no supplementary feed. In a study by Strydom *et al.* (2008), it was found that intake of lucerne pasture dry matter increased significantly with supplementary feeding of 500 g/bird/day, while lucerne production also tended to increase at this level of supplementation. Further increases in supplementary feeding had no significant effect on the pasture, but it tended to result in a decline in pasture production and intake. Moderate levels of feed supplementation (500 g/bird/day) therefore increased efficiency by increasing pasture production and intake. Moderate supplementation should therefore make it possible to increase the stocking rate and thus overall meat yield. Stocking rate is the most powerful factor influencing efficiency of pasture use by animals (Davies & Southey, 2001). The ideal stocking rate will ensure that there is a perfect balance between the growth of any new herbage and its harvesting by ostriches. Achieving the optimum balance between the number of animals and pasture production must therefore be the main objective of a grazing system (Cloete *et al.*, 1992). If the stocking rate is ideal, the ostrich will be presented with a constant supply of young and nutritious herbage (McDonald *et al.*, 2002). If the stocking rate is too high, the animals will graze the pasture too frequently or prematurely and this will deplete the organic reserves needed for regrowth of the plants. This ultimately leads to a poor stand and reduced production of the stand (Donaldson, 2001). If a pasture is not grazed short enough, however, some plants will be avoided and become mature, which will result in an overall decline in forage quality, lower forage dry matter intake and dry matter production (Rayburn *et al.*, 2007). Herbage availability and sward production can be matched with animal management by either changing the number of animals per unit area or by changing the time allotted to graze a pasture or by supplying the animal with supplementary feed (Belesky *et al.*, 2007). The simultaneous effects that stocking rate and level of supplementation of grazing finishing ostriches on the production and intake of pasture have never before been investigated. This experiment was therefore conducted to determine the effect of two stocking rates of ostriches and two levels of supplementary feeding on the intake and production of irrigated lucerne pastures over a period of five months.

Materials and Methods

The study was conducted at the Kromme Rhee Experimental Farm in the Western Cape Province near Stellenbosch. The experimental design was a complete randomized design with split plots and two main factors (i.e. level of supplementary feeding at 0 and 800 g/bird/day and stocking rates of 10 and 15 birds/ha), with months as subplots (January to May), which were replicated a few times. Lucerne (*Medicagosativa*) pastures (cv. SA Standard) were established four years prior to the experiment. Prior to this, the soil was analyzed and the pH, P and K levels adjusted by fertilization. The lucerne was established in autumn by broadcasting at 12 kg seed/ha. Before sowing, the seed was inoculated with the appropriate *Rhizobium* nodule bacteria. The lucerne pasture was fenced into 16 treatment paddocks of approximately 0.85 ha each. The pastures were also irrigated weekly during the summer, using an overhead sprinkler system. One hundred and seventy African Black ostriches (*Struthiocamelus* var *domesticus*) of mixed gender (± 6 months old) were obtained from different ostrich producers in the Oudtshoorn area of the Western Cape. The birds were randomly allocated to four treatment groups, two groups of 50 ostriches each (therefore leading to a stocking rate of 15 birds/ha) and two groups of 35 ostriches each (stocking rate of 10 birds/ha). Ostriches were adapted to the lucerne pasture prior to the start of the trial. The ostriches were allowed to graze each paddock rotationally for a period of two weeks or until the pasture became depleted, whichever came first, before the group was rotated to the next paddock. The supplementary feed supplied was formulated according to the nutrient requirements of the ostriches for this growth stage at a level of 1000 g supplementary feed + 1500 g lucerne pasture/bird/day) (Brand & Gous, 2006). At the onset of the experiment, the ostriches in each group were weighed individually by means of a mobile electric scale (Rudweigh 200®, Contry) and their starting weights recorded. Pasture production and pasture intake by the ostriches were measured by placing five exclosure cages randomly in each treatment paddock before grazing started. Pasture production (kg/ha/day) was calculated as the difference between the amount of plant material outside the cages in the previous measurement and the amount of plant material inside the cages in the current measurement. This is then divided by the amount of days in between the two measurements. The pasture intake by the ostriches was calculated as the difference between the amount of plant material within the cages and the amount of plant material outside the cages at the end of each grazing period. The available and residual pasture dry matter was determined inside and outside the exclosure cages by cutting the pastures to ground level within 0.166 m^2 quadrants using hand shears. The samples were, after washing with water to remove soil, dried to constant mass at 57 °C, immediately weighed and used for the determination of the dry matter content. Statistical analyses were done using Proc GLM (SAS 9.1.3 for Windows, 2002 - 2003).

Results and Discussion

A significant interaction was found between level of supplementary feeding and month for intake (Figure 1). Intake was not significantly influenced by supplementary feeding during January, February, March and April, but during May lucerne dry matter intake was significantly higher at 0 g/bird/day than at 800 g/bird/day. This seems to indicate an increasing level of replacement of grazed lucerne dry matter by supplementary feeding as the trial progressed. This agrees with studies done by various researchers, which stated that when grazing dairy cows are fed increasing amounts of supplements, pasture dry matter intakes will usually decrease (Grainger & Mathews, 1989; Stockdale, 2000; Bargo *et al.*, 2003). This is supported by the fact that there tended to be an interaction ($P \leq 0.10$) between stocking rate and level of supplementary feeding in terms of lucerne dry matter intake (Figure 2). This resulted in lucerne dry matter intake being higher ($P \leq 0.10$) at 15 birds/ha than at 10 birds/ha at 0 g supplementary feeding/bird/day, while at 800 g supplementary feeding/bird/day there was no difference in lucerne dry matter intake. Stockdale (2000) found a significant interaction between level of substitution and unsupplemented pasture intake when concentrates are fed. The substitution of pasture increased for each additional kg of concentrate fed. This is clearly seen in Figure 2.

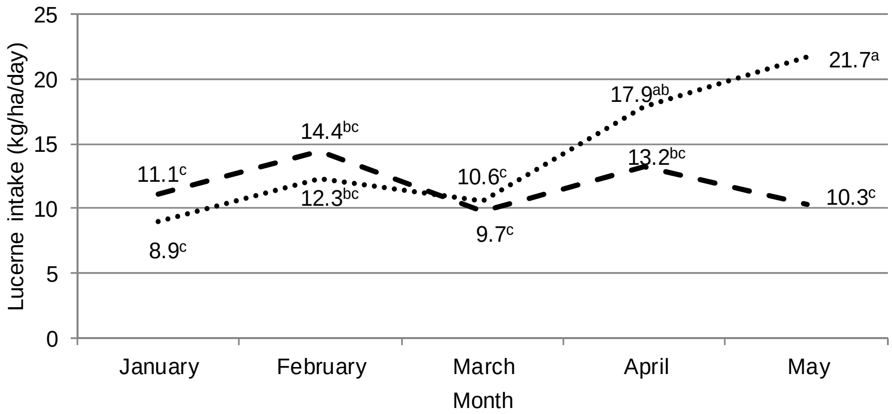

Figure1 Mean lucerne intake (kg/ha/day) from January to May by grazing ostriches, as influenced by two levels of supplementary feeding (0 g/bird/day …… and 800 g/bird/day ------).

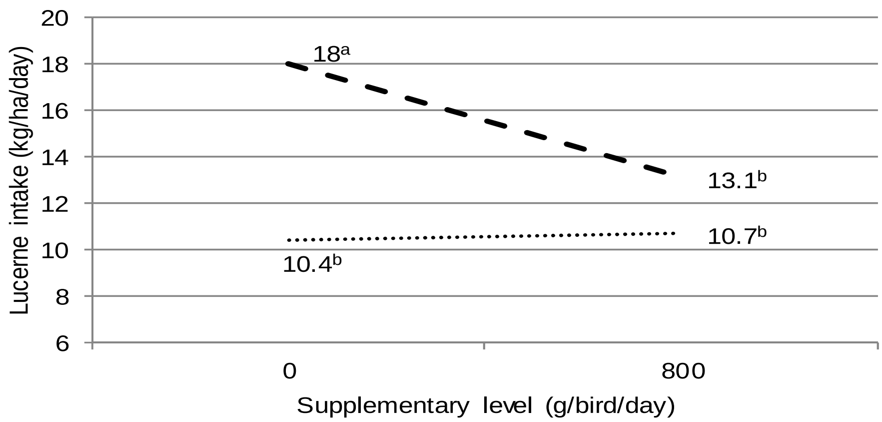

Figure2 Mean lucerne intake (kg/ha/day) by grazing ostriches at two levels of supplementary feed as influenced by two stocking rates (10 birds/ha …… and 15 birds/ha -----).

In the case of lucerne dry matter production a significant interaction was found between stocking rate and month (Figure 3). During January, February and March lucerne dry matter production was higher at the 15 birds/ha stocking rate than at 10 birds/ha, while there was no difference in April. Lucerne production was higher at 10 than at 15 birds/ha in May, probably due to overgrazing in the case of the 15 birds/ha group.

The high stocking rate of 15 birds/ha therefore seems to have had a gradual depressing effect on lucerne dry matter production. From April, the utilization at the lower stocking rate of 10 birds/ha was, however, more efficient while lucerne was overgrazed at 15 birds/ha, resulting in lucerne production being significantly higher at the low than the high stocking rate in May. The less severe levels of defoliation at the low stocking rate possibly promoted lucerne dry matter production in the longer term.

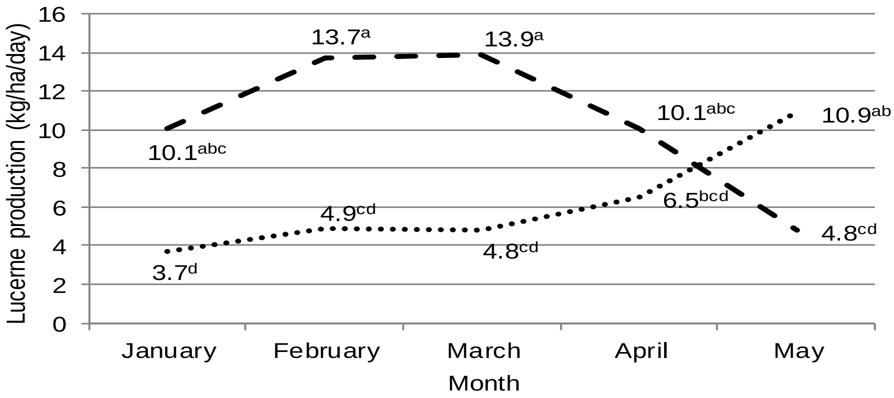

Figure3 Mean lucerne production (kg/ha/day) from January to May 2007 as influenced by two stocking rates of grazing ostriches (10 birds/ha …… and 15 birds/ha ------).

Conclusions

Stocking rate, as well as level of supplementary feeding, influenced lucerne dry matter intake, but only stocking rate influenced lucerne production. Supplementary feeding depressed lucerne intake at the high stocking rate. Supplementary feeding did not influence lucerne production, but the high stocking rate eventually depressed production.

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