

Education and research in animal and grassland production

N.M. Tainton

Department of Grassland Science, University of Natal, Pietermaritzburg

In spite of the obvious interdependence of animals and grasslands, both education and research in South Africa have been largely intra- rather than interdisciplinary. There are a number of possible reasons for this. Universities find it difficult to train prospective researchers to an adequate level in two major biological disciplines in the present 4-year curriculum. Then, on being employed, most researchers find themselves operating in specialist animal or grassland research units, and for a number of reasons are discouraged from developing interdisciplinary programmes. Added to the inappropriateness of the administrative structures is the fact that research at the animal/grassland interface is extremely complex and is often costly, and is not readily amenable to the type of statistics which has formed the basis of statistical training at Universities. Given the appropriate climate, however, many of the inherent problems in such research can be overcome. What is needed, before this can happen, is a concerted effort to modify the administrative structures so that interdisciplinary work is actively encouraged and rewarded.

S. Afr. J. Anim. Sci. 1986, 16: 134 – 136

Ten spyte van die voor-die-hand-liggende interafhanklikheid van diere en weiding is die onderwys en navorsing in Suid-Afrika grootliks intra- eerder as interdisiplinêr. Daar is verskeie moontlike redes hiervoor. Universiteite vind dit moeilik om voornemende navorsers tydens die huidige vierjarige leerplan op te lei tot 'n voldoende vlak in twee hoof biologiese dissiplines. In 'n werksituasie bevind die meeste navorsers hulle in gespesialiseerde diere- of weidingnavorsingseenhede en word dan om verskeie redes ontmoedig om interdisiplinêre programme te ontwikkel. Bydraend tot die ontoereikendheid van die administratiewe strukture is die feit dat navorsing op die diere-/weidingstussenvlak uiters kompleks en soms baie duur is en dat dit nie maklik aan die tipe statistiek wat die basis van statistiese onderrig aan universiteite vorm, onderwerp kan word nie. Onder die regte omstandighede kan baie van die inherente probleme van dié tipe navorsing egter oorbrug word. Voordat dit kan gebeur is daar egter 'n gesamentlike poging nodig om die administratiewe strukture te verander sodat interdisiplinêre werk aangemoedig en beloon sal word.

S.-Afr. Tydskr. Veek. 1986, 16: 134 – 136

Presented at the Symposium on 'The scientist serving animal production' at the 25th Annual Congress of the South African Society of Animal Production, Transkei, 15 – 17 April, 1986

N.M. Tainton

Department of Grassland Science, University of Natal, Pietermaritzburg, 3201 Republic of South Africa

Introduction

The interdependence of animals on the one hand, and of veld and pastures on the other, hardly needs elaboration. Quite clearly, animals need the forage produced by these communities for their very existence, and even in the modern technologically orientated agriculture of today, the cattle, sheep and goat industries in South Africa are estimated to depend for over 90%, and perhaps for as much as 95%, of their nutrient intake on veld and planted pastures. Looking at this interrelationship from the point of view of the grassland scientist, its relevance is no less apparent. Much of the natural veld of South Africa owes its very nature to its evolutionary association with grazing and browsing animals, whilst of course its general degradation in recent years can be ascribed largely to poor livestock management practices. In planted pastures the relationship is somewhat different, but not less critical. Most pastures are planted for no other reason than to provide forage for livestock.

Recognizing the close ties which exist between livestock and veld or between livestock and pastures, we need to look closely at the extent to which this is reflected in research and teaching in these disciplines. In this paper an attempt is made to do so from the point of view of each of the two disciplines.

Education

Discussion will be restricted to University training, because it is only here that future researchers and teachers at the tertiary level are trained.

Of the Universities in South Africa and in the National and Independent States, six are providing training in Animal Science (or Production) and Grassland (or Pasture) Science in Faculties of Agriculture. However, it is noteworthy that although all have fully independent Departments of Animal Science (or Production), only two (Natal and the OFS) have independent Departments concerned with veld and pasture management. At the other four Universities, the staff involved in teaching in this field operate either in conjunction with Crop Scientists (or Agronomists) or in Departments of Plant Production. It is of note, also, that a concerted effort was made at Natal University in the late 1970s to amalgamate the Departments of Crop, Horticultural and Pasture Science into a single Department of Plant Production. The fact that this move failed does not disguise the general attitude which held sway. It seems, therefore, that in at least five of the six Universities which have Faculties of Agriculture, training and research in veld and pasture management is believed to be more closely allied to the Crop Science discipline than to

Animal Science. This attitude has no doubt arisen because both Crop Science and Grassland Science are concerned with plants as the basic raw material on which they work. But the level of association here is surely considerably weaker than that between Grassland Science and Animal Science, yet to my knowledge there have been no moves to consolidate these two disciplines into a single administrative unit.

Nevertheless, the fact that the disciplines of Animal Science and Grassland Science exist as administratively separate entities at Universities does not necessarily mean that teaching is not covered in both disciplines in certain curricula. Indeed, in many of the curricula there is substantial training in both disciplines, but there are normally others which are heavily weighted or confined entirely to only one of the disciplines.

At this point it is necessary to look at the dilemma in which the Universities find themselves in drawing up curricula for students in this area of study, and in doing so we need to look at the associated ancillary courses which students in Animal and Grassland Science need in their training. In both these fields, an adequate knowledge is required in the fields of biochemistry, genetics, meteorology, statistics, microbiology and economics. Also, Grassland Science students need courses in soil fertility and pedology. Add to these courses the required training in plant anatomy, taxonomy, morphology, physiology and ecology for Grassland Science students, and the animal physiology, anatomy, histology, pathology and animal products technology required by Animal Science students, and one can envisage a curriculum which cannot possibly fit into a 4-year degree programme. Therefore, there is no option but to see depth and breadth of training as mutually exclusive. In the final analysis, therefore, it is probably unrealistic to attempt to train prospective researchers to the required level in both Animal and Grassland Science in an undergraduate curriculum. It seems that the concept of a major discipline should therefore be retained in the curriculum, but students majoring in either discipline should be required to reach some minimum level of proficiency in the other discipline. This could perhaps best be achieved by establishing curricula with a designated major and a subsidiary minor, e.g. an Animal Science major coupled with a Grassland Science minor and vice versa.

Using this model, interdisciplinary research could then be achieved not by requiring each individual officer to establish independent interdisciplinary programmes, but by developing teams of researchers which are represented by researchers with different major/minor combinations.

Research

It is in this area in particular that I believe that our approach to livestock production research has fallen far short of the ideal. Perhaps this can be ascribed largely to the administrative structures operating in both the Universities and in the Department of Agriculture and Water Supply. Because researchers in the Department work, like those in the Universities, in administratively separate units, any collaboration between members of the different units will depend largely on the personal whims of the researchers involved. Each group often works independently of the other, and even the objectives of the two groups may be very different.

I would like to examine this aspect further, because I believe it is central to the lack of coordination in animal/grassland research. The reasons for the tendency for Universities to provide curricula in which students major in only one of the disciplines have already been alluded to. Having graduated, the newly appointed research officers are posted either to a

specialist institute or to a region, where they join either an animal or a grassland research team. If appointed to an institute, the direction of their work will be relatively unambiguous. They will most likely work on some relatively elegant problem within the confines of their specialist discipline, and generally without any direct contact with researchers in other disciplines. Alternatively, if they are appointed to a region, they will join a specialist research section (in this case, either Animal Science or Pasture Science). Lacking in confidence at this stage, they will in all likelihood confine their research to those areas for which their training has best prepared them, i.e. to an intradisciplinary rather than an interdisciplinary area. They are likely to be reluctant to cross discipline boundaries for fear of being accused of poaching onto other's territory, or of being accused of being ill prepared to do such work. The individual's progress is likely to be more assured and fraught with fewer problems if he sticks to the confines of his discipline. To compound the researcher's problems even further, the administrative structure which governs the registration of projects makes it difficult to develop interdisciplinary work, because each project must have a designated home in a specific section and have as its project leader a member of that section only. Officers from other collaborating sections are given little recognition for their efforts. Young researchers, in particular, seem to find this arrangement particularly frustrating. Therefore, while it is possible for researchers working in the regions to collaborate with those working in other disciplines, such collaboration must often be at a personal level. The administrative structure does not encourage this and tends, even if unconsciously, to discourage it.

In spite of the above restrictions, it is pleasing to note that at least some research groups have collaborated closely in recent years. It needs to be emphasized, however, that this interdisciplinary work has arisen in spite of, and not because of, the situation in which the researchers find themselves. Also, it is quite clear to many grassland scientists that there are still serious problems associated with such interdisciplinary work which they feel unqualified to handle. For example, the whole question of developing a meaningful laboratory-based expression of the quality of forage, and of that produced by veld in particular, which is consistent with the way in which the animal perceives that forage, is one which remains to be answered satisfactorily.

An additional important factor in discouraging collaborative work in animal and grassland production is, without doubt, the complexity of work in this field compared with much of that in the individual discipline and, in particular, the complexity of work on forage as a source of nutrients for livestock. It is clearly much easier for an animal scientist working in animal nutrition to conduct trials with concentrate feeds, or at worst with milled conserved forages which can be thoroughly mixed and fed to animals under controlled conditions. Here intake can be readily measured and the material consumed by the animals can be specifically identified. How much more difficult, however, to have to work with the grazing animal, where the quantity of material consumed is difficult to estimate and where it is difficult even to identify what component of the pasture is being grazed.

The same with the grassland scientist. It is far easier to establish a set of experimental plots in some formal statistical arrangement and to use a mower to simulate the grazing animal than to establish grazing trials. Results of such trials can be published with asterisks in the appropriate places to denote statistical significance of treatment variables. This

invariably delights the editors of scientific journals, notwithstanding the fact that statistical significance may bear no relation to biological significance or, even worse, that the results may have no biologically useful meaning in the first place. Many research programmes have in the past been prostituted by the need to fit them into an inappropriate statistical design or, alternatively, the statistical manipulation of the data has been inappropriate and procedures which to the uninitiated appear to be highly sophisticated and reliable, may in effect be grossly misleading. The point at issue here, and I believe it is an important one, is that most of us have been brought up to believe that the analysis of variance is the only reliable statistical method of handling research data. This form of statistical analysis has its place in some types of work, but it is often totally unsuited to grazing trial work. The need of such work is for more sophisticated analytical procedures and until appropriate skills are developed in these

procedures it is unlikely that much progress will be made in the field of animal/grassland interrelationships.

In the final analysis I believe that research in animal and grassland production will continue to retain separate identities so long as researchers in these disciplines are required to work in separate administrative units. So long as separate institutes and separate departmental sections control agricultural research, no permanent and effective collaboration will develop between animal and grassland scientists. My appeal, therefore, is to modify the administrative structures to reflect the need for collaborative research. As a start, an Institute of Animal and Grassland Research should replace separate institutes concerned with animal and grassland research, and animal and pasture research sections in the regions should be integrated into single units in which research funding and researcher recognition is designed to encourage multidisciplinary research effort.