Guidelines for Authorship of Scientific Articles
Author(s): James G. Dickson, Richard N. Conner and Kent T. Adair
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bear oak shoots were clipped and weighed during September 1970. This shoot growth was considered to be an index of browse production since the shoots were within reach of all deer and were relatively succulent.

There was a significant age effect ($P < 0.01$) and a significant fertilizer effect ($P < 0.05$) on browse production in bear oak. Browse production, in terms of fresh weight, increased with increasing age between 5 and 13 years, and with the addition of fertilizer, at the rate of 896 kg/ha (Table 1). Stand density, at the levels studied in this experiment, had little influence on browse production. However, qualitative observations of browsing preference on New Jersey's outer coastal plain indicate that deer prefer the shoots produced by the younger trees rather than those produced by the older trees. Deer also appear to prefer the browse produced by the fertilized trees over that produced by the unfertilized trees.

Wolgast (1973) and Wolgast and Stout (1977) have shown that the addition of fertilizer at the rate used in this study significantly increases acorn yields in bear oak trees which are between 9 and 13 years old. An additional benefit of fertilization is an increase in browse production.

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LEONARD J. WOLGAST, Department of Horticulture and Forestry, Cook College, Rutgers University, New Brunswick, NJ 08903.

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GUIDELINES FOR AUTHORSHIP OF SCIENTIFIC ARTICLES

The move toward interdisciplinary and team research imposes special requirements for guidelines that delineate authorship rights of the scientists involved. Each contributing individual of a research team should be accurately recognized.

We propose some simple guidelines and recommend their adoption *before* research projects begin. Adoption of standards should prohibit unauthorized or unethical use of data and should enhance maintenance of professional ethics.

Research investigations can be divided into 5 basic areas: conception, design (procedures), data collection, data analysis, and manuscript preparation. The relative importance of each area varies considerably among studies. Some investigations are innovative and emphasize an original idea, rather than extensive data collection. In other investigations, the idea of the research is not unique and most of the effort is in data collection and analysis. In some studies intricate research design or establishment of sophisticated mea-

surement procedures requires the most effort. Every researcher is aware of the work involved in the writing phase of a project.

Determination of authors and sequence of authorship of manuscripts should be based on contributions in each facet of the research. All authors should have made significant contributions in writing (at least a review of the manuscript) and in at least 1 additional area of investigation.

Much wildlife research is being conducted by universities and research unit employees of state, federal, and other cooperative agencies. In federal agencies, many studies involve a researcher dominant in all areas except data collection which is often done by technicians. The researcher should be the sole author in this situation unless the technician is allowed and accepts responsibility in more areas.

At universities, much research involves a professor/graduate student relationship with varying contributions from each. If the student is given and accepts responsibility in all areas he should be first author of manuscripts, or sole author if the professor has not made substantial contributions to the study in at least 2 of the 5 areas. If the professor conceives and designs a project and is instrumental in other areas, he should be first author. If the student is supposedly conducting original research, the situation should be discouraged where the student achieves his main goal (the degree), but the major professor becomes the sole author. If the student has not contributed sufficiently to merit authorship, he or she probably has not fulfilled the degree requirements of original research.

Directors of research units or laboratories should not automatically be authors of research publications from the research organizations (CBE Style Manual Committee 1978:8); nor should authorship be automatically tied to source of funding for research. All authors should be active participants in the actual workings of a project.

In situations at universities and research agencies where the person contributing the most to a research study has no intention of publishing the results (usually because of departure from the organization), another person involved in the study should be able to assume senior authorship if he or she writes the manuscript. In this situation the person contributing the most should be offered the chance to review the manuscript and be a junior author.

Adoption of these or similar guidelines will help ensure proper recognition of the contributions of each researcher. It would also ensure that study results would be published by some member of a research team with adequate recognition for the contributions of others. At the very least, proper prior planning would avoid situations where contributions of some remain unrecognized.

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JAMES G. DICKSON AND RICHARD N. CONNER, USDA Forest Service, Southern Forest Experiment Station, Nacogdoches, TX 75962, AND KENT T. ADAIR, School of Forestry, Stephen F. Austin State University, Nacogdoches, TX 75962.

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