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NUTRIA PELT QUALITY VARIATION IN SOUTHCENTRAL LOUISIANA

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Abstract—Reported declines in nutria pelt quality in Southcentral Louisiana prompted a study of regional variation in nutria pelt quality and individual variation in hair and skin characteristics. We collected a total of 102 nutrias from six areas and prepared the pelts according to methods used by professional trappers. Pelts were graded by an experienced fur buyer, and hair and skin characteristics were quantified on five sections of the ventral portion of each pelt using seven pelt quality variables. Fur buyer grades and all pelt quality variables, except percentage of pelt damage, differed among areas. All pelt quality variables differed among sections of pelts. All sections of pelts were subject to varying pelt quality, but quality was poorest on the posterior end of pelts. Poor quality pelts were low in fur weight, underfur weight and length, guard hair length and density, and skin weight, and high in percentage of broken guard hairs. Results of fur buyer grades and laboratory pelt analysis differed among areas.

Key words: nutria, fur, pelt damage.

Introduction

The nutria (Myocastor coypus) has been a major part of the fur industry in Louisiana for over 30 years (Kinler et al. 1987). The harvest of nutria pelts has been valued at over $5 million annually (Tarver et al. 1987). In addition to providing income for trappers and landowners, healthy nutria fur markets increase trapping pressure and keep nutria populations under control, thus decreasing damage to marshes and crops (Ensminger 1955).

Fur buyers have reported reduced quality of nutria pelts in certain areas of Southcentral Louisiana in recent years. In some areas, the quality of nutria pelts has deteriorated to a point that pelts are no longer marketable. The reason for the decline in nutria pelt quality is unknown; however, Maum (1986) suggested that pelt quality differences between western and eastern nutrias were caused by environmental rather than genetic factors.

Numerous factors may influence pelt quality. Hair growth is easily disturbed in furred animals and almost any kind of nutritional stress or systemic disease can result in hair loss (Maguire and Hanno 1985). Deficiencies in protein (Lightbody and Lewis 1929, Strangeway 1933, Kawinska et al. 1975), essential fatty acids (Rainbird 1987, Lloyd 1989), vitamins such as
biotin and B₂ (Ensminger and Olentine 1978, Wallach and Hoff 1987), and minerals such as copper, potassium, and zinc (Wallach and Hoff 1987) can cause pelt quality problems.

Hormones control the growth and loss of hair (Worthy et al. 1987). Environmental factors can cause hormonal responses that may negatively affect hair growth (Donavon 1961). Exposure to toxic substances can cause many detrimental effects on furbearers including problems associated with the hair and skin (Wilson 1961). There are many non-nutritional diseases that cause skin and hair problems. Chronic dermatitis caused by a plant, smooth beggartick (Bidens laevis), affects the quality of nutria pelts in Louisiana (Chabreck et al. 1977). Many species of fungi and microscopic invertebrates have been linked to hair and skin problems (Andrews 1930: 539, 791). Other possible causes of pelt quality problems may be self-inflicted injury and damage caused by certain physical aspects of the environment. Schwartzman and Mather (1960) reported that self-inflicted injury such as biting, licking, and scratching were the most important factors causing dermatooses in canines. Chabreck and Dupuiie (1970) reported seasonal variation in nutria pelt quality and suggested that low water levels resulting in excessive travel by nutria over dry ground and vegetation may harm the belly fur, the most valuable portion of a nutria pelt. In recent years, fur buyers have reported that pelts of nutrias from some areas in Southcentral Louisiana have sections with a low density of hair or broken guard hairs. The nutria fur trade describes the condition as a “skip,” and report that a “skip” will greatly reduce the value of a pelt.

The objectives of our study were to determine variation in nutria pelt quality in selected areas of Southcentral Louisiana and variation in hair and skin characteristics in different sections of pelts. If pelt quality varied among areas of similar habitat in Southcentral Louisiana, then further study may be necessary to determine the cause of the variation and develop corrective measures.

**Methods**

The study was conducted on six areas in Southcentral Louisiana (Fig. 1). Areas 1 and 2 were in St. Mary Parish near the Wax Lake Outlet. Area 1 was west of the Wax Lake Outlet between Leopard Bayou and Hog Bayou, and Area 2 was 0.25 km east of the Wax Lake Outlet along the south side of Towhead Bayou. Area 3 was located in St. Mary Parish south of Ellerslie near Morone Point. Area 4 was located in Terrebonne Parish in the Lake Hatch Oil and Gas Field and 1.5 km west of Lake Theriot. Areas 5 and 6 were near the Archafalaya River in St. Mary Parish. Area 5 was along Big Doctors Bayou and 0.8 km north of the intersection of Big Doctors Bayou and Big Hog Bayou, and Area 6 was 0.7 km north of the mouth of Big Hog Bayou.

According to Chabreck and Linscombe (1988), all six study areas were located in a fresh marsh vegetative type. Typical vegetation of fresh marsh is maiden cane (Panicum hemitomon), Hydrocotyle spp., water hyacinth (Eich-
hornia crassipes), pickerelweed (Pontederia cordata), alligatorweed (Alternanthera philoxeroides), and bulltongue (Sagittaria spp.). Based on furbuyer interviews, nutrias from Areas 3 and 4 (easternmost and westernmost areas) previously had greater hair density and length than nutrias from Areas 1, 2, 5, and 6. Therefore, Areas 3 and 4 were designated as control areas.

We collected 102 nutrias from 8–12 January 1990: $N = 17$ from Areas 2, 3, 4, and 5, and $N = 16$ from Areas 1 and 6. Only adults (live-weight >3.5 kg) were collected. Nutrias were pelleted, stretched, and dried similar to methods used by trappers in southern Louisiana.

Dried pelts were graded by a furbuyer experienced at grading nutria pelts and placed in one of three grades. The three grades were based on hair density, hair length, and skin thickness on the belly portion of the pelt. To eliminate any bias of the grading, pelts were mixed and the furbuyer was not advised of the collection sites.

Eight pelt quality variables were measured on the belly portion of each pelt: percentage of each pelt subject to a “skip”, fur weight, underfur weight, underfur length, guard hair length, guard hair density, percentage of broken guard hairs, and skin weight. Five sections were identified on each pelt (Fig. 2), and all pelt quality variables except “skips” were measured on two randomly selected swatches (each 1 cm$^2$) from each section (Unruh 1991).

The location of each swatch was marked on the skin side of the pelt, and the swatch was removed with a scalpel, weighed, and labeled. Underfur
length was measured with vernier calipers while the swatch was held against a lighted background to make underfur fibers more visible.

Swatches were soaked in a calcium hydroxide solution for four days to loosen the hairs and allow easy extraction of hairs. Swatches were removed from the solution, rinsed in water, and allowed to dry 15 minutes. Guard hairs were removed from the swatch with tweezers and placed on a sheet of white paper. Broken (flat apex) and unbroken (pointed apex) guard hairs were counted as they were removed to determine guard hair density and percentage of broken guard hairs. Five unbroken guard hairs were randomly selected and measured to determine average guard hair length.

The percentage of a pelt containing "skips" was determined by cutting the pelt longitudinally down the center of the back so that the pelt could be opened and flattened and the belly fur exposed. If a "skip" was observed, a plate glass (30 cm × 90 cm × 5 mm thick) was placed over the flattened pelt. The outline of the belly portion of the pelt, front leg holes, and "skips" were traced on the glass with a wax pencil and then transferred to tracing paper. A digitizer and Autocad software were used to determine the area of the pelt below the front legs and the area of "skips." The percentage of the pelt containing "skips" was computed.

The null hypothesis that the distribution of furbuyer grades did not differ among study areas was tested with the Chi-square Goodness of Fit test (Steel and Torrie 1980). "Skips" were placed into three categories based on the percentage of "skips" on the belly portion of the pelt: 0%, 0.1–10.0%, and >10.0%. The relationship of pelt quality variables to study areas and sections of the pelt was determined with a series of repeated measures analysis.
Table 1. ANOVA results testing differences among study areas and sections of the pelts for hair and skin variables from nutria collected in six freshwater marsh areas in Terrebonne and St Mary parishes, Louisiana, January, 1990.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Area (m,²)</th>
<th>Section (m,²)</th>
<th>Area × section (m,²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>P&gt;F</td>
<td>df</td>
</tr>
<tr>
<td>Fur weight</td>
<td>13.93</td>
<td>0.0001</td>
<td>5.94</td>
</tr>
<tr>
<td>Underfur weight</td>
<td>27.71</td>
<td>0.0001</td>
<td>5.94</td>
</tr>
<tr>
<td>Underfur length</td>
<td>3.95</td>
<td>0.0027</td>
<td>5.94</td>
</tr>
<tr>
<td>Skin weight</td>
<td>11.86</td>
<td>0.0001</td>
<td>5.94</td>
</tr>
<tr>
<td>Guardhair length</td>
<td>3.89</td>
<td>0.0030</td>
<td>5.94</td>
</tr>
<tr>
<td>Guardhair density</td>
<td>7.78</td>
<td>0.0001</td>
<td>5.94</td>
</tr>
<tr>
<td>Percentage of broken guardhairs</td>
<td>2.99</td>
<td>0.0149</td>
<td>5.94</td>
</tr>
</tbody>
</table>

* Statistics presented based on Wilks' Criterion test.
* m = model, e = error degrees of freedom (df).

of variance tests using the GLM procedure of SAS (SAS Institute 1987). Multivariate tests using the Wilks' lambda statistic were used to test for sectional effects and section-by-area interactions, and univariate F-tests were used to test for area effects for the seven pelt quality variables (excluding "skips"). Sectional differences for each area were determined with ANOVA. If ANOVA indicated significant sectional differences within individual areas (P < 0.05), differences were identified using Least Significant Difference test (LSD).

RESULTS

Variation Within Pelts

Section and area effects and section-by-area interactions for fur weight were significant (Table 1). Fur weights in different sections of pelts varied among areas. The general within-pelt pattern from all study areas was a decrease in fur weight from the center to the sides of the pelt and a decrease in fur weight from the anterior to the posterior of the pelt (Fig. 3). Section and area effects and section-by-area interactions for underfur weight were significant (Table 1). Underfur weights in sections differed among areas (Fig. 4). Underfur weights in sections A (mid-chest) and C (mid-belly) were greater than underfur weights in sections B (outer chest) and D (outer belly) in two of the six areas and greater than section B in four areas. Underfur weights did not differ between sections A and C or between B and D. Underfur weights in section E (mid-posterior) were less than underfur weights in all other sections in all areas. Thus, underfur weights tended to be greater in the center of the pelt than on the sides, similar for the anterior and middle of the pelt, and least at the posterior of the pelt.

Section and area effects and section-by-area interactions for underfur length were significant. Underfur lengths from sections differed in all areas (Fig. 5). Underfur length in section D was greater than in all other sections
in all areas and in section E was less than in other sections. Underfur length tended to be greatest on the middle side, increased from the anterior center to the middle center of the animal, and decreased from the middle to the posterior of the animal.

Section and area effects and section-by-area interactions for skin weight were significant (Table 1). Skin weights differed among sections in Areas 2, 4, 5, and 6 (Fig. 6). In those areas, skin weight in section A was greater than the other sections. Sections B, C, D, and E did not differ. Thus, skin weight was greatest at the anterior center of the pelt, but similar over the remaining portion of the pelt. Section and area effects for guard hair length were significant, but area-by-section interactions were not significant (Table 1). Guard hair length in pelt sections differed in all areas. Guard hair length in section D was greater than guard hair length in other sections, and guard hair length in section E was less than guard hair length in other sections. Thus, guard hairs tended to be longer on the sides than the center of the belly. Guard hair length did not differ between the anterior center and the
middle center, but was less at the posterior of the animal. Section and area effects and area-by-section interactions for guard hair density were significant (Table 1). Guard hair density differed among sections in Areas 1, 2, 4, 5, and 6 (Fig. 7). Guard hair density was greatest at the anterior center, followed by the middle center. Section and area effects and area-by-section interactions for percentage of broken guard hairs were significant (Table 1). Percentage of broken guard hairs differed among sections in Areas 2, 3, and 5 (Fig. 8).

Geographic Differences in Pelt Quality

Fur buyer grades. The distribution of fur buyer grades was not homogeneous among study areas ($\chi^2 = 21.39$, df = 10, $P = 0.019$). The individual chi-square value that contributed most to the overall chi-square was associated with the best grade in Area 3. The chi-square test was not significant if Area 3 was removed from the analysis ($\chi^2 = 11.8$, df = 8, $P = 0.162$). Areas 1 and 6 had higher than expected frequencies of poorest grade pelts. Only Area 3 had a higher than expected frequency of best pelts.
Laboratory pelt analysis. The distribution of the categories of percentage of "skips" was homogeneous among study areas ($\chi^2 = 18.5$, df = 10, $P = 0.050$). A high frequency of "skips" in the $>10\%$ category and a low frequency of skips in the $0\%$ category occurred on pelts in Area 3. A high frequency of skips in the $0\%$ category and a low frequency of "skips" in the $>10\%$ category occurred on pelts in Areas 4 and 2. Area effects were significant for all pelt quality variables measured on sections of the pelt (Table 1). Pelts from Area 6 tended to have the greatest fur weights followed by pelts from Area 4 (Fig. 3). Fur weights of pelts from Areas 2 and 5 were generally greater than pelts from Areas 3 and 1. Pelts from Area 6 tended to have the greatest underfur weights followed by pelts from Areas 4 and 5 (Fig. 4). Underfur weights of pelts from Areas 1, 2, and 3 were similar. Pelts from Area 6 tended to have the greatest underfur length followed by pelts from Area 4 (Fig. 5). Underfur lengths of pelts from Areas 1, 2, 3, and 5 tended to be similar. Pelts from Area 6 tended to have the greatest skin weights followed by pelts from Areas 4 and 5 (Fig. 6). Skin weights of pelts from Areas 1, 3, and 2 were less than pelts from Areas 6, 4, and 5. Pelts from
Area 6 had the greatest guard hair lengths followed by pelts from Area 4 and 2. Guard hair lengths of pelts from Areas 1, 5, and 3 were similar. Pelts from Area 6 had the greatest guard hair densities followed by pelts from Areas 4, 5, 3, and 2 (Fig. 7). Pelts from Area 1 had the lowest guard hair densities. Pelts from Areas 6 and 4 had the lowest percentages of broken guard hairs followed by pelts from Area 5 (Fig. 8). Pelts from Areas 3, 2, and 1 had the greatest percentages of broken guard hairs.

**DISCUSSION**

Based on the laboratory analysis of 102 nutria pelts, we concluded that skin, underfur, and guard hair features were all part of the pelt quality problem. Poor pelts were characterized by below average fur weight, underfur weight and length, guard hair length and density, and skin weight, and an above average percentage of broken guard hairs. Specific problems relating to pelt quality were hair loss, depressed hair growth, hair fragility, and thinning of the skin. Depressed hair growth may not have been a serious problem. Hair regrowth to replace lost hair may have accounted for the abnormally low guard hair and underfur lengths. Other problems were a lacklustre appearance of guard hairs, irregular or lack of pigmentation, easy removal of guard hairs on fresh skins, and guard hairs with smaller than normal diameters.

Kaszowski and Kawinska (1960) and Niedziadek (1982) analyzed pelts of ranch Nutria and determined that underfur and guard hair characteristics varied among sections of the pelt. We observed similar sectional trends, except for section E. Section E had poorer guard hair and underfur qualities than the other sections. Although pelt analysis variables differed among areas, sectional trends were similar among areas. This evidence suggests that the entire ventral portion of nutrias was subject to reduced pelt quality, but this condition was more severe at the posterior end of the ventral surface of the animal than the anterior portion.

Based on furbuyer grades and the laboratory pelt analysis, pelt quality of animals differed among areas. However, the results of these two methods of determining area differences in pelt quality differed. Based on grades, pelts from Area 3 were the best and pelts from Areas 1 and 6 were the poorest. Based on the laboratory pelt analysis, pelts from Area 6 were best, followed by pelts from Area 4. Pelts from Areas 1 and 3 were the poorest. The subjective nature of grading nutria pelts may account for the discrepancy between the two methods of pelt quality determination. Another possible reason for the discrepancy may be that some pelt characteristics used by the furbuyer were not included in the laboratory analysis.

Nutritional deficiencies can produce all of the pelt quality problems that we observed and quantified on the nutria (Rainbird 1987, Wallach and Hoff 1987). However, Unruh (1991) was unable to relate diet quality, cover of important nutria food plants, and abundance of smooth beggartick in the area to pelt quality. Maun (1986) examined nutria pelts from several areas in Louisiana and founds that pelts of nutria from western Louisiana were of
higher quality and had greater underfur length and lower skin weight than nutria from eastern Louisiana. Ramsey and Maum (1987) reported that nutria from western Louisiana also had greater concentrations of copper and phosphorus in the hair than nutria in eastern Louisiana.

Dry marsh conditions were not encountered during the study, therefore it is unlikely that pelt quality problems were caused by excessive travel by nutrias over dry vegetation and soil. Nutria densities were not excessive during the study (Unruh 1991), therefore stress factors resulting in reduced pelt quality were unlikely. Pelt quality may be related to diseases and parasites; mites, nematodes, and fungi were observed on the pelts during a clinical examination of animals with poor quality pelt. Further examination of nutria pelts for disease-related problems is recommended.

CONCLUSIONS

Herbivory by nutria can cause considerable damage to marshes when the population density in an area become excessive (Harris and Webert 1962, Kinler et al. 1987). Removal of nutria as part of an annual fur harvest program by landowners and trappers has been effective in preventing overpopulation in most areas (Tarver et al. 1987). However, low market value of nutria fur because of the poor quality of pelts from a particular area may reduce nutria harvests in the area (Kinler et al. 1987).

The presence of "skips" on nutria pelts reduced pelt quality and caused a reduction in nutria harvest on a portion of our study area. Should the problem increase on the area or spread to new areas, revenue from the sale of pelts could be lost. Also, without a harvest to regulate nutria density, overpopulations capable of damaging the marshes may develop. Additional information on the cause of "skips" and possible corrective measures is needed.

LITERATURE CITED


