

A COMPARISON OF DEER HUNTER AND FARMER ATTITUDES ABOUT CROP DAMAGE ABATEMENT IN MICHIGAN: MESSAGES FOR HUNTERS, FARMERS AND MANAGERS.

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ABSTRACT: During the last 20 years several states have seen dramatic changes in the size of their white-tailed deer (*Odocoileus virginianus*) populations and also more frequent debates about how the deer resource should be managed. One central area of conflict between stakeholders involved in deer management is the issue of the lethal control of depredating deer, and how and when programs involving lethal control should be implemented. In the last decade, both Michigan farmers and deer hunters have organized special interest groups to express their dissatisfaction with deer population numbers, deer-caused crop losses, and/or the state's crop depredation control program. In April - June 1995, we surveyed agricultural producers (n= 596) and deer hunters (n= 792) in 7 Michigan counties about their attitudes and behaviors regarding deer and deer management. We identified several factors that appear to influence farmer and deer hunter attitudes about the Michigan Department of Natural Resources' use of Block and Shooting Permits in their management approach to deer-crop depredation. Perceptions of program administration are an important factor impacting on both farmer and deer hunter approval of Shooting and Block Permits. Deer hunter approval of Shooting and Block Permits also appears to be influenced by the perceived fairness of the permit system and the proximity of the hunter's place of residence to the area in which they hunt.

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Both deer hunting and agriculture make economic and cultural contributions to the state of Michigan and its citizens. Unfortunately, in Michigan and elsewhere these two industries have been in conflict with one another for some time regarding acceptable levels of deer populations. In 1995, the issues associated with crop depredation by deer received the attention of the State House Committee on Agriculture and Forestry. Prior to this several citizen action groups (UPWARD, Citizens for Responsible Wildlife Management, Concerned Sportspeople & Businesspeople of NE Michigan) had formed to espouse the views of either hunters or farmers about the deer herd size and/or crop losses. The Michigan Department of Natural Resources' (MDNR) approach to deer depredation control is one particular area of conflict between hunting and agricultural interests.

Though several studies have examined farmer and landowner attitudes toward deer populations and crop damage (Decker and Brown 1982, Tanner and Dimmick 1983, Stoll and Mountz 1986, Morgan et al. 1990), few studies have been done on the conflicts that stem from the use of

special permits to control deer-crop depredation. Shooting and Block Permit acceptance have recently received research attention in Wisconsin and Michigan. In Wisconsin, Horton and Craven (see paper by Horton in this proceedings) examined attitudes about Wisconsin's Shooting Permit system (it is important to note that Wisconsin's program differs administratively from Michigan's in several ways). Nelson and Yuan (1991) studied farmer, hunter, and adjacent landowner attitudes about the Block Permit system 2 years after its inception in Michigan as part of the program's 3 year evaluation.

Synopsis of Michigan's Deer Depredation Control Permits

Three permit systems are used to encourage the harvest of antlerless deer in specific areas to help reduce the local deer population and control crop losses.

Shooting Permits -- In 1983, the Natural Resources Commission in Michigan adopted Out-of-Season Shooting Permits to help control deer depredation of agricultural crops. These permits are issued to

farmers whose losses to deer are deemed significant by MDNR biologists. The permits are issued to kill depredating antlerless deer at times outside of the regular firearms, muzzleloader and archery deer seasons. Permits allow antlered deer to be shot only when circumstances are deemed appropriate by MDNR biologists. The permits are valid only for times, fields, and the number of deer designated by the biologist. In most areas, deer shot under this permit system are to be collected by MDNR personnel or designated persons and distributed to charitable causes. Up to 3 designated shooters can be allowed to fill the permits, and there is no charge to the farmer for the permits.

Block Permits -- In 1990, another type of permit was introduced to reduce the number of Shooting Permits issued and to use licensed deer hunters to control crop losses. Block Permits are valid only for shooting antlerless deer during the regular fall hunting seasons. The biologist determines how many deer should be taken, and then these permits are issued in "blocks" of five or more to farmers with documented losses. Farmers must purchase these bonus licenses for a cost of \$3.00 each. The licenses are then distributed by the farmer to licensed hunters for use on their farm or adjacent lands with the permission of adjacent landowners. Hunters are allowed to keep the deer they shoot, and there is no limit to the number of Block Permit licenses that a hunter can fill. Licenses are also transferable between hunters so that unused tags can be returned to the farmer and then reissued to other hunters. All regular hunting season restrictions apply as to the type of equipment and legal shooting hours.

Regular Antlerless Lottery Licenses -- Michigan also uses a lottery system to allocate a limited number of antlerless deer hunting licenses in the majority of its deer management units. Antlerless licenses are issued both through a general and a private lands lottery. Selected hunters are issued 1 license to harvest an antlerless deer on the land they specified on their application.

As a result of the intensity of the crop damage issue, the Michigan Agricultural Experiment Station, Michigan State University Extension, and the Michigan Department of Natural Resources funded this multi-disciplinary study of the deer damage issue to develop a better understanding of the situation in Michigan. As part of this study we investigated the application of a cultural carrying capacity model (Minnis and Peyton 1995) to the deer damage issue by surveying 4 stakeholder groups involved in deer management issues in Michigan -- deer hunters, farmers, extension agents, and wildlife biologists. In this paper we offer an initial comparison of the attitudes and perceptions of deer hunters and farmers regarding Michigan's program of issuing special permits to reduce crop losses by killing deer.

METHODS

We confined our study to 7 specific regions of the state which provided selected variability in the nature of deer crop depredation issues. Study counties represented a range of areas where the intensity of the crop damage debate was high and areas where the issue intensity was moderate to low. Counties were also selected to represent a range of crop types, deer densities, and primarily agricultural and forested landscapes. Because this was not a statewide random sample, exact percentages given in the Results section of this paper are not generalizable to all Michigan farmers nor deer hunters, though some trends may be cautiously generalized.

We conducted 33 personal interviews and 4 focus groups with farmers and deer hunters respectively in order to develop hypotheses and generate questionnaire items.

Extension mailing lists for each study county were used to identify farmers. Either an entire list was used or a random sample was drawn, depending on the size of the list. Sample frame sizes ranged from 545 for Calhoun county to 100 for Benzie county. Hunter samples were randomly drawn from an MDNR database of 1993 Firearms Deer Survey returns. We stratified hunters based on

where they lived and where they hunted because we suspected that there might be variation in hunter opinions based on their familiarity with agriculture. We chose one sample of hunters who lived and hunted in one of our agricultural study counties and another sample who lived in a county designated as a Metropolitan Statistical Area but hunted in one of our agricultural study counties (Michigan Dep. of Management and Budget 1993). We also stratified hunters by their 1993 antlerless deer application status because of the potential influence of attitudes toward doe harvest on attitudes associated with the crop damage issue. We mailed questionnaires to 2,134 Extension clients and 1,257 deer hunters between April and June 1995. Even though this was not a convenient time for farmers, we achieved a 52% response rate from the Extension mailing lists. Though extension agents were asked to clean their lists so that they represented just those people growing crops, approximately half of our "farmer" respondents indicated that they were either retired farmers or non-farmers and were therefore excluded from our analysis. Thus, the results reported in this paper represent the responses of 596 full- or part-time farmers from the seven counties. We defined full-time farmers as those individuals who spent >50% of their working time engaged in farming activities. Sixty-five percent (n=792) of the deer hunters also returned the questionnaire. Only 4% (31 individuals) of the responding deer hunters indicated that their primary occupation was farming, so there was little chance of a hunter/farmer in one of the study counties receiving both questionnaires.

We conducted telephone follow-up interviews with both hunter and farmer non-respondents. We attempted to contact 29% of the farmers (n=280) and 35% of the deer hunters (n=149) by phone. We were successful in contacting 205 farmers and 69 hunters for a brief interview. These interviews revealed no significant differences between this group and those who had responded to the mail survey.

RESULTS AND DISCUSSION

Approval of Shooting and Block Permits

The central question of this portion of our research was whether hunters and farmers approved or disapproved of the Shooting and Block Permit systems. We hypothesized that special permits given to farmers to kill deer outside of the regular hunting season would not be looked on favorably by hunters. Our hunter respondents clearly disapproved, and our full-time farmers on the whole approved, while the part-time farmers were split on their approval (Fig.1). This difference between the distributions of full and part-time farmers may be partially explained by the larger proportion of part-time farmers in our sample who deer hunt. Sixty-five percent of the full-time farmers indicated that they deer hunt, whereas 79% of the part-time farmers indicated that they deer hunt ($\chi^2=10$, df 1, $p<0.002$). We hypothesized that if hunting participation is a factor in determining attitudes about permit systems then the Block Permit system should receive more support from hunters and part-time farmers. Such support was indeed apparent for hunters whose mean Block and Shooting Permit scores significantly differed (Wilcoxon matched-pairs $z = -8.29$, $p=0.000$) (Fig.2). The mean approval scores for full- and part-time farmers did not differ significantly by permit type; however, mean approval scores did differ significantly for those part-time farmers who hunt deer (Wilcoxon matched-pairs $z = -2.18$, $p=0.029$).

Fairness of Shooting and Block Permits

Fairness is a major concern of hunters regardless of permit type (Fig.3). Although the Block Permit system involves hunters in the culling process, it is still perceived by most hunters as being unfair. Table 2 illustrates responses of deer hunters to questions regarding hunter access to permits issued to farmers. Results suggest that restricted access to farms causes hunters to view the permit program as unfair, and many hunters appear to resent that farmers' friends and relatives have an advantage in being able to access and use permits even though these permit users are licensed hunters.

Ironically, a majority of hunters also felt that the farmer should be allowed to decide which hunters can use the available permits.

The level of hunter familiarity with the regulations of the permit systems may also explain some of the perceived unfairness of the permit systems. On a self-reported scale, 49% of hunter respondents indicated that they knew "some or most" of the regulations of the Shooting Permit system, and 60% indicated that they knew the same amount about the Block Permit regulations. As expected hunters were slightly less knowledgeable about Shooting Permit regulations as they are not generally involved with them. Significant differences existed between the knowledge of Block Permits reported by those hunters who lived in the county (65% "knew some or most") and those who lived in a metropolitan county (52% "knew some or most") ($\chi^2 = 17$, df 3, $p < 0.001$). Deer hunters' Shooting Permit knowledge also varied with place of residence. Resident county hunters were more familiar (52% "knew some or most", $\chi^2 = 8$, df 3, $p < 0.05$) with Shooting Permit regulations than hunters who lived in a metropolitan county (43% "knew some or most"). Similar segmentation of responses to other questions has revealed that county inhabitants were more likely to express stronger opinions, whereas hunters from metropolitan counties were more undecided and less likely to express extreme opinions. This suggests that local hunters are more familiar with permit regulations and perhaps more sensitive to inconsistencies or abuses of the programs than hunters from metropolitan counties where there is by definition less agriculture.

Perceptions of Program Administration

Resource Utilization --

Our data also indicate that the integrity of the program and its administration are issues of concern especially among hunters but also among farmers. Though Shooting Permit regulations in most areas stipulate that deer shot on Shooting Permits should be processed and given to charity, both hunters and some farmers perceive that some deer are not being utilized and that waste is occurring. A majority of

the hunters (61%) and 40% of the farmers agreed that too many deer shot on Shooting Permits were not being utilized. Significantly more hunters who lived in study counties (67%) than hunters from metropolitan counties (51%) perceived that "waste" was occurring ($\chi^2 = 28$, df 4, $p < 0.001$). Forty-two percent of the hunters who lived in metropolitan counties were undecided. There were also differences between those farmers who had requested either type of permit and those who had not ($\chi^2 = 61$, df 8, $p < 0.001$). Of those farmers who requested permits, only 29% perceived "waste" occurring, whereas 46% of farmers who had never requested permits perceived that "waste" was occurring.

Distribution of Special Permits. --

Fifty-seven percent of our hunter respondents felt that "too many" part-time farmers and people with other sources of income were receiving permits. However, only 6% of the part-time farmers in our sample reported that they had ever received Shooting Permits, and only 10% reported that they had ever received Block Permits. A larger number of full-time farmers reported they had received Shooting (34%) or Block Permits (28%) at least once in the past. We also found that 46% of the hunters we surveyed believed that "in general farmers [could] get permits regardless of the amount of loss they [were] incurring," suggesting that hunters may not trust the DNR to issue permits only for valid cases of crop loss.

Defining loss as a "legitimate damage claim." --

We hypothesized that farmers and hunters would have different opinions about what amount of loss might warrant the issuing of deer control permits. We asked hunters to tell us what percentage of a farmer's total crop should be lost to deer before kill permits should be issued, and 55% of the hunters responding offered an amount (median 15% of crop, mean 17%, S.D.=12.8). Seventeen percent of the hunters indicated that they felt that permits should never be issued regardless of the amount of loss, and 28% indicated that they had no idea. This loss amount was then compared with actual percent losses that farmers reported were a problem in 1994.

Farmers reported their crop acreage, yield, perceived losses, and indicated their tolerance of those losses by checking one of three boxes: "Not a Problem," "A Problem, but not enough to take action" (tolerable), or "A Problem, requiring that additional action to reduce losses be taken" (intolerable). We calculated their percent losses and then compared the median percent losses for the tolerable and intolerable problem categories (Table 3). The hunter median of 15% is only slightly higher than the median percent losses reported by farmers in the intolerable problem category (10-15%). However, it should be noted that the range of intolerable percentages varied greatly among farmers. Further, not all farmers would be affected equally by the same percent of loss, and thus it would be inappropriate to use these percentages as an absolute cut off for establishing eligibility for shooting permits. Ideally situations should be managed proactively so that intolerable losses are anticipated and avoided, instead of trying to eliminate a situation once it has occurred.

Agency Credibility. --

The credibility attributed to a management agency by its constituents involves two components. One is the perceived level of trust the constituents place in the agency to represent their interests. The second is the assessment of the agency's expertise or competence to manage. Our data indicate both the expertise and the trustworthiness of the Michigan DNR are questioned by a substantial number of deer hunters and farmers in our seven study counties. Nearly half of the hunter respondents believed that DNR biologists could adequately determine crop losses, but 50% of the hunter sample either disagreed or were undecided. Similarly, 66% of the farmers were undecided or disagreed. Further credibility problems were suggested by 74% of the hunters who were not sure or did not believe that DNR biologists were awarding permits only to farmers who actually have significant crop losses.

We also constructed agency credibility scales for both hunters and farmers based on their responses to a series of questions about the DNR.

Though response scales were the same, the questions used in creating the credibility scales for the agency were not identical between the two surveys and so can not be directly compared numerically; however, the mean DNR credibility ratings by hunters (0.116) was positive, whereas the mean rating by farmers (-0.068) was negative (on both scales +2 = most positive credibility rating, [PAFJ]-2 = most negative credibility rating, 0 = Undecided). Agency credibility was lower for full-time farmers (-0.129) than for part-time farmers (0.067) (Mann-Whitney U z = -2.47, p < 0.02). The agency credibility score by hunters who lived in a study county (-0.03) was more negative than that by hunters residing in a metropolitan county (0.13) (Mann-Whitney U z = -1.91, p = 0.0559).

In addition to looking at overall agency credibility, we also constructed a scale to evaluate the credibility of local biologists among farmers. These mean credibility ratings differed by county (-0.27 to 0.49) (Kruskal-Wallis $\chi^2 = 28.3$, df 5, p < 0.001). We tested the hypothesis that mean biologist credibility ratings would differ based on the frequency of contact with the local biologist. As contact time with the biologist increased, mean credibility improved (Kruskal-Wallis $\chi^2 = 27.7$, df 2, p < 0.001). The tendency for credibility of the local biologist to improve with increased contact with biologists held even for those farmers reporting the most serious crop loss problems (Kruskal-Wallis $\chi^2 = 14.0$, df 2, p < 0.001). An important inference of this finding is that poor attitudes about the agency and its professionals -- at least those associated with crop damage control programs -- are not generally the result of personal interactions with agency personnel. It appears that wildlife professionals are generally effective in their personal dealings with crop damage complaints by farmers, but may be too constrained by budget and time to fully meet this public relations need.

IMPLICATIONS

At least 4 implications of this research are important for natural resource agencies dealing with crop depredation to consider.

First, despite there being some agreement between hunters and farmers that permits may be necessary at some level of loss, the amount of that loss will continue to be controversial. Since farming and depredation situations vary greatly, we believe that an agency should allow for flexibility when establishing regulations and protocols for awarding depredation permits. Agencies should expect that such flexibility will cause criticism from hunting and farming interests; however, informational messages to these stakeholders explaining the need for situational flexibility should help to defray such criticism.

A second important finding of this work is that both groups have expressed concerns that losses are not properly identified by the DNR biologists; however, the strength and frequency of this belief among farmers decreases as farmers have more personal contact with DNR biologists. We believe that it is important that biologists continue to personally interact with farmers and work with them to evaluate their losses.

Another finding was that farmers differentiate between the management agency and the agency's professionals when forming perceptions of credibility. Though more frequent contacts with agency biologists increased their personal credibility with farmers, more frequent contacts did not improve the credibility of the agency as a whole. Thus, it is important that the agency also work to improve stakeholder perceptions of the competence and trustworthiness of the agency as a whole. Areas that an agency may be able to improve its credibility with stakeholders are by tightening up its administration of Shooting and Block Permit programs and addressing areas of concern to stakeholders such as the belief that too much waste is occurring.

Finally, the significant differences identified in this paper (full-time vs. part-time farmers, hunters' place of residence, etc.) serve to illustrate the importance of segmenting stakeholder groups and not relying on gross level generalizations of farmers and hunters when investigating issues such as attitudes about crop depredation control permits.

Our research is not yet complete, but it appears that additional segmentation analyses will provide further recommendations for gaining greater acceptance of programs involving lethal control and agency programs in general.

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Table 1. Study county profiles of issue intensity, major crop types, and ratio of agricultural lands to forested lands.

County	Issue Intensity ^a	Major Crop Types ^b	Ratio of Ag. to Forest ^c	Deer/Car Accidents per miles driven ^d
Calhoun	Low	Corn, Soybeans, Wheat	56 : 24	0.97
Montcalm	Low to Moderate	Beans, Corn, Potatoes, Alfalfa, Wheat	53 : 29	2.42
Oceana	Moderate to High	Apples, Cherries, Vegetables	38 : 54	1.61
Benzie/Leelanau	Moderate to High	Apples, Cherries	21 : 79	1.12
Presque Isle	High	Beans, Corn, Alfalfa	19 : 74	2.45
Menominee	High	Corn, Alfalfa	18 : 79	4.26

^a Pers. Commun. MDNR & MSU Extension; ^b 1993 Michigan Agricultural Statistics, MI Dept. of Agriculture; ^c 1993 Forest Inventory, North Central Forest Experiment Station; ^d 1991 Michigan State Police.

Table 2. Deer hunter attitudes that may explain perceived unfairness of the Block Permit system.

	Agree	Undecided	Disagree
In general, I am satisfied with the number of farmers in [study county] county who allow hunters other than their relatives or friends to use their Block Permits. (n=729)	18.5%	42.4%	39.1%
A farmer who receives Block Permits should be required to allow a certain number of hunters who are not their friends or relatives to use the permits. (n=726)	54.5%	20.7%	24.8%
The farmer to whom the Block Permit is issued should be allowed to decide which licensed hunter gets to use the Block Permit. (n=729)	50.3%	16.3%	33.3%

Table 3. 1994 reported losses perceived as problematic by farmers

Crop type (Units reported)	n	Median % loss that was: "A Problem" (range)	Median % loss that was: "A problem that required additional action/control be done to reduce losses" (range)
Corn (bushels)	122	3.0% (0-24%)	9.6% (0.1-61.5%)
Soybeans (bushels)	41	2.0% (0.1-16.7%)	13.4% (0.8-100%)
Alfalfa (tons)	60	5.0% (0-40%)	12.5% (0.7-100%)
Table beans (Cwt.)	19	7.7% (1-13.1%)	14.8% (1-64.6%)

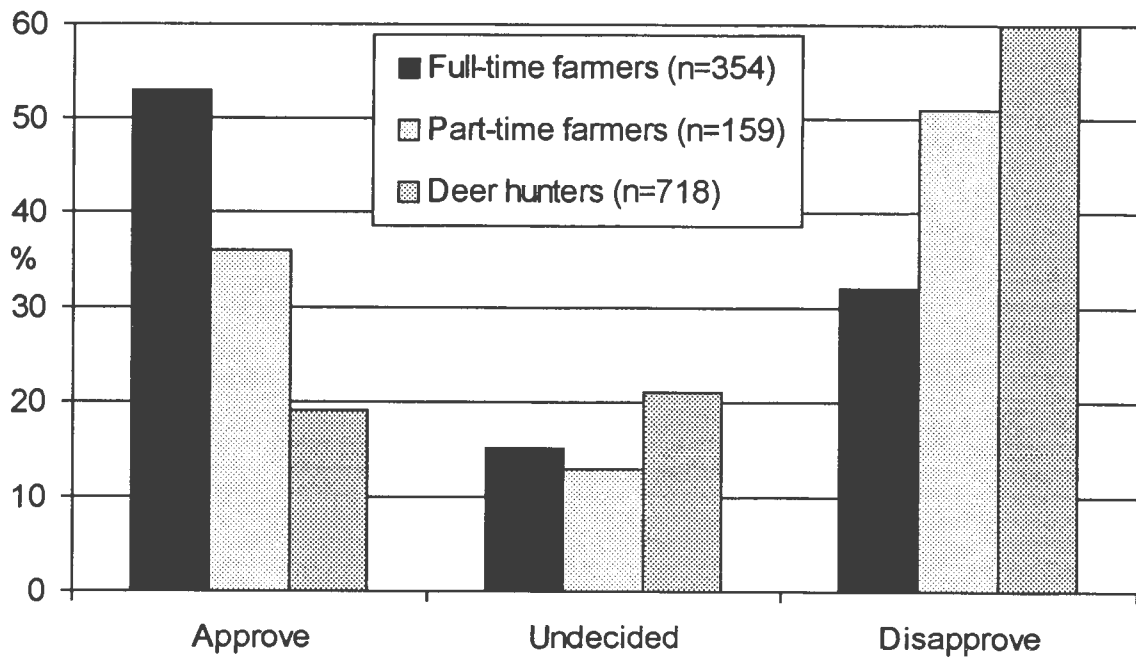


Figure 1. Approval of Shooting Permits by farmers and deer hunters.

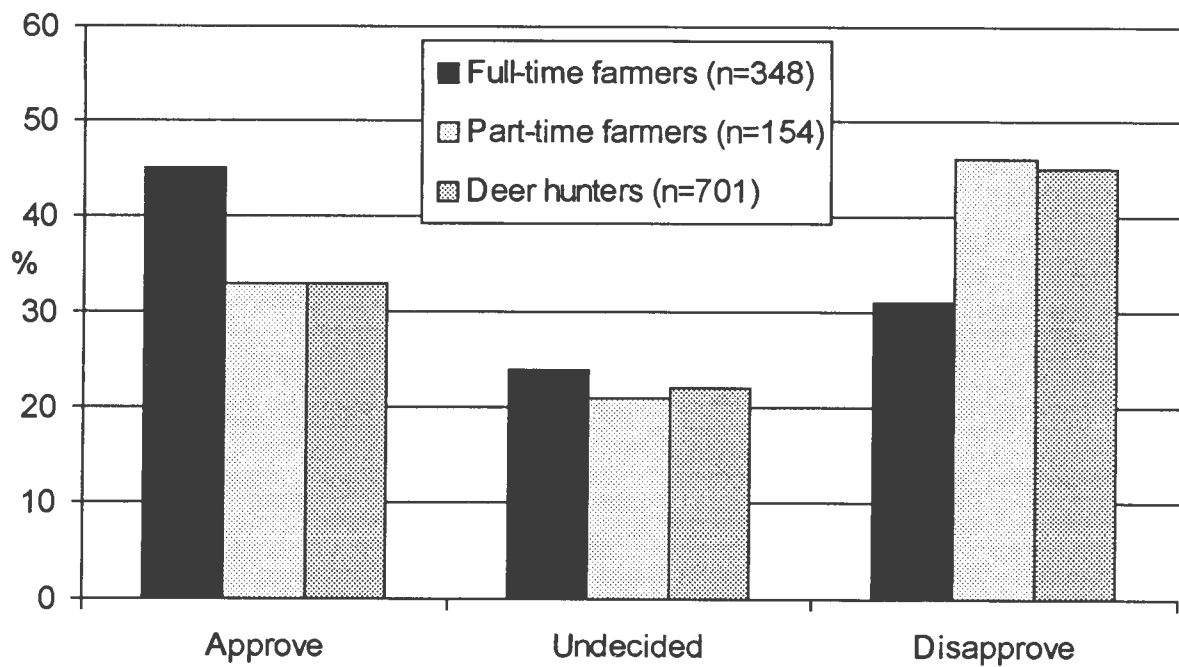


Figure 2. Approval of Block Permits by farmers and deer hunters.

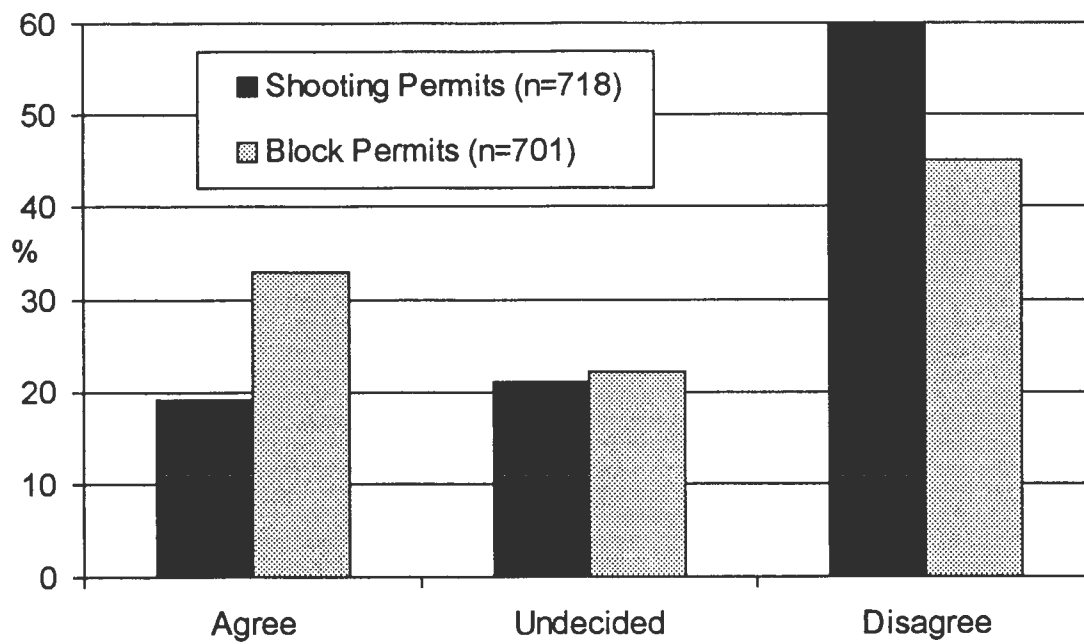


Figure 3. Deer Hunters' Attitudes Regarding Fairness of Permit Systems.