THE QUALITY OF EUROPEAN ROE DEER (*CAPREOLUS C. CAPREOLUS* L.) AND AN ASSESSMENT OF BREEDING AND HUNTING PROCEDURES REALIZED IN ITS POPULATION IN FOREST DIVISIONS LOCATED IN THE OLSZTYN DISTRICT OF THE POLISH HUNTING ASSOCIATION

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Abstract. The aim of the paper is to present the ontogenetic quality of the roe deer and an assessment of breeding and hunting procedures for its population in forest divisions of the Olsztyn District of the Polish Hunting Association. The collected data came from annual hunting plans for the season 2002/2003 and from the records of culled males of deer in the hunting season 2001/2002. The statistical data concerned 203 hunting grounds. The gathered statistical material was used for calculating breeding indicators and ontogenic quality parameters of the roe deer in particular forest divisions, including the form of antlers, mean carcass weight and gross weight of antlers.

Key words: roe deer, *Capreolus capreolus*, antlers, game management

INTRODUCTION

The roe deer (*Capreolus c. capreolus* L.) is the smallest and most common representative of the cervid family in Poland.

According to the general rules for managing game populations [Rozwałka et al. 1997], the density of roe deer in Polish hunting areas should range from 6 to 15 animals per 100 ha of hunting ground, i.e. up to 150 animals per 1000 ha of a hunting ground (a document of the Regional Directorate of the State Forests – Density of the roe deer in forest hunting areas) [Zasady... 2001]. Anticipated growth realized in annual hunting plans should run at the level of 25-30%, and within the established realized growth, the ratio of animals harvested according to sex groups should be the following: roebucks (males) 40%, does (females) 50% and kids 10%. For roebucks, harvesting in age groups

should be kept at the following level: class I (animals in their 2nd-3rd year) – 40-50%, class II (in their 4th year and older) – 50-60% [Zalewski 2002]. Modern game management of roe deer populations requires the creation of a system to monitor deer breeding, so as to intervene in the development of the population and effectively counterbalance unfavourable factors. [Zalewski et al. 2001].

The aim of the paper was to present the ontogenetic qualities of the roe deer and assess the breeding and hunting procedures realized in its population in forest divisions located in the Olsztyn District of the Polish Hunting Association.

MATERIALS AND METHODS

The research data analysed in this paper comprised the roe deer population in the area of the Olsztyn District of the Polish Hunting Association, which includes the 27 forest divisions (Fig. 1) that form a part of the Regional Directorates of the State Forests in Olsztyn and Białystok (hunting grounds No. 68, 110, 111). The collected data came from annual hunting plans for the season 2002/2003 and from the records of culled males of deer in the hunting season 2001/2002. The statistical data concerned 203 hunting grounds, i.e. all grounds located in the area of the Olsztyn District of the Polish Hunting Association.
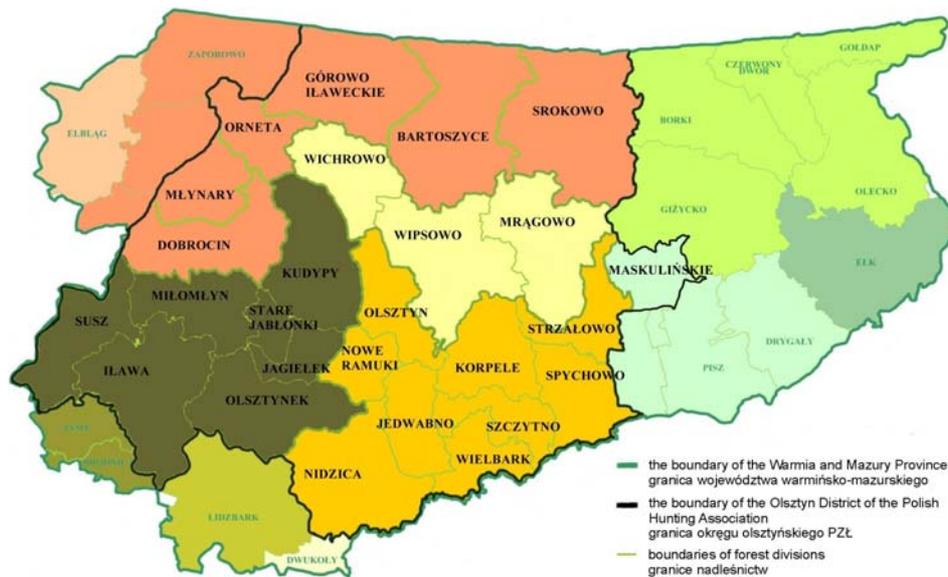
Fig. 1. Forest divisions situated the Olsztyn District of Polish Hunting Association
Rys. 1. Nadleśnictwa położone w olsztyńskim okręgu PZŁ

Hunting grounds (182) are used by hunting clubs, and the management of the remaining 21 grounds is held by Game Breeding Centres.

The gathered statistical data from annual hunting plans for 27 forest divisions, i.e. all 203 hunting grounds, was used for calculating the following breeding indicators for the forest divisions:

1. Realization of planned harvest of roe deer for a hunting season **(A)**

$$A = \frac{\text{culling in the season 2001/2002}}{\text{a culling plan in the season 2001/2002}} \times 100\%$$

2. Planned harvest of the roe deer in relation to their spring population **(B)**

$$B = \frac{\text{a culling plan for the hunting season 2002/2003}}{\text{state as of 31.03.2002}} \times 100\%$$

3. Exploitation of the roe deer population **(C)**

$$C = \frac{(\text{state before the hunting season 2002/2003}) - (\text{state as of 31.03.2002})}{\text{a culling plan for the hunting season 2002/2003}} \times 100\%$$

Data concerning the age structure of the realized culling of roebucks and their ontogenetic quality concerns the area of 22 forest divisions used by hunting clubs of the Olsztyn District of the Polish Hunting Association. Game Breeding Centres are not included. While analysing, within this range, the sheets of correctness for culling deer males, the following factors were taken into consideration: the age of the specimen, the weight of its carcass, the gross weight of spikes and the form of antlers according to CIC system [Stachowiak 1994, Varićak 2000], with the division into two age classes: class I – roebucks in their 2nd and 3rd years (first and second antlers) and class II – roebucks from their 4th year on (third and further antlers) [Zalewski et al. 2001].

Additionally, four age groups of roebucks were distinguished:
– group 1 – in their 2nd year,
– group 2 – in their 3rd year,
– group 3 – in their 4-5th year,
– group 4 – in their 6th year and older.

In the present paper, the Forest Divisions of: Dobrocin, Młynary, Orneta, Iława, Lidzbark Welski and Maskulińskie do not belong entirely to the Olsztyn District of the Polish Hunting Association, therefore the results obtained in these forest divisions, and particularly in the Forest Divisions of Lidzbark and Maskulińskie, should be treated individually (Fig. 1).

The analysis of the data gathered in the assessment sheets for the correctness of roebuck culling consisted in providing the number of animals (n) and calculating the statistics: the arithmetic mean ($\bar{x}$) and the standard deviation (s). The calculations were made in an Excel spread sheet, and the obtained results are presented in the form of tables and charts.

RESULTS

The quality of roe deer (*Capreolus c. capreolus* L.) and an assessment of breeding and hunting procedures realized in its population in forestry divisions located in the Olsztyn District of the Polish Hunting Association

The data collected indicate that in the season 2001/2002 in the Olsztyn District, the cull of roe deer involved almost 10 000 animals.

While analysing the roe deer population in forest divisions (Table 1), it should be noted that the indicator of realization of planned harvest for the season 2001/2002 reached

Table 1. Game management realized in the roe deer population in the season 2001/2002 in the forest divisions situated within the Olsztyn District of the Polish Hunting Association
Tabela 1. Gospodarka łowiecka realizowana w populacji sarny w sezonie 2001/2002 w nadleśnictwach położonych w Okręgu Olsztyńskim PZŁ

No. Lp.	Forest Division Nadleśnictwo	Roe deer, animals Sarny, osobniki					Breeding indicators, % Wskaźniki hodowlane, %		
							A	B	C
		culling plan 2001/2002 plan odstrzału 2001/2002	realization of culling 2001/2002 wykonanie odstrzału 2001/2002	state as of 31.03.2002 stan na 31.03.2002	state before the season 2002/2003 stan przed sezonem 2002/2003	culling plan 2002/2003 plan odstrzału 2002/2003	realization of harvesting plan for the season 2001/2002 realizacja planu pozyskania w sezonie 2001/2002	planned harvesting in relation to spring population planowane pozyskanie w stosunku do wiosennego stanu	exploitation of eksploatacja populacji
		1	2	3	4	5	2/1	5/3	4-3/5
1	Bartoszyce	474	461	1464	1894	473	97	32	91
2	Dobrocin	596	495	1571	1995	565	83	36	75
3	Górowo Iławeckie	459	431	1456	1891	567	94	39	77
4	Iława	669	633	2358	3067	651	95	28	109
5	Jagiełek	164	148	542	683	164	90	30	86
6	Jedwabno	213	182	644	837	193	85	30	100
7	Korpele	456	447	1390	1798	474	98	34	86
8	Kudypy	587	518	1363	1808	609	88	45	73
9	Lidzbark Welski	36	30	68	88	42	83	62	48
10	Maskulińskie	165	164	820	985	165	99	20	100
11	Miłomłyn	470	440	2020	2569	478	94	24	115
12	Młynary	45	35	160	208	48	78	30	100
13	Mrągowo	600	592	1885	2435	663	99	35	83

Table 1 – cont.

		1	2	3	4	5	2/1	5/3	4-3/5
14	Nidzica	450	345	1356	1695	540	77	40	63
15	Nowe Ramuki	142	113	430	559	186	80	43	69
16	Olsztyn		247	645	804	253	95	39	63
17	Olsztynek	606	541	1835	2216	567	89	31	67
18	Orneta	237	233	919	1194	261	98	28	105
19	Spychowo	460	405	1136	1619	341	88	30	142
20	Srokowo	487	450	3009	3868	632	92	21	136
21	Stare Jabłonki	160	154	600	760	150	96	25	107
22	Strzałowo	380	367	995	1286	299	97	30	97
23	Susz	573	556	1809	2306	597	97	33	83
24	Szczytno	237	202	1030	1247	193	85	19	112
25	Wichrowo	492	460	1460	1921	489	93	33	94
26	Wielbark	109	95	597	714	113	87	19	104
27	Wipsowo	971	921	2856	3698	969	95	34	87
Total – Ogółem		10 498	9 665	34 418	44 145	10 682	92	31	91

reached the highest values of 99% in The Maskulińskie Forest Division and the Forest Division of Mrągowo. The ratio of 98% was recorded in Korpele and Orneta. The lowest value of this indicator was observed in the Forest Division of Nidzica – 77% and Młynary – 78%. The indicator (B), planned harvest in relation to spring population, reached its lowest level of 19% in Szczytno and Wielbark. In these forest divisions, indicator (C), exploitation of population, exceeded the value of 100%: in Szczytno – 112%, and in Wielbark – 104%. It should be also noted that the largest population of the roe deer was found in the Forest Division of Srokowo – 3009 animals, and the smallest was in Lidzbark Welski – 68 animals, which is not surprising in view of the area of this forest division that belongs to the district. This forest division achieved the highest value of indicator (B) – 62%, together with the lowest value of indicator (C) – 48%. This should be alarming, considering the game management conducted in this area. The highest values of the indicator of population exploitation, totalling over 100%, were observed in 8 forest divisions: Spychowo – 142%, Srokowo – 136%, Miłomłyn – 115%, Iława – 109%, Szczytno – 112%, Stare Jabłonki – 107%, Orneta – 105% and Wielbark – 104%. In the Forest Divisions of Młynary, Jedwabno and Maskulińskie, the indicator reached the value of 100%. What should be alarming is the fact that in 14 forest divisions, out of 27 analysed (52%), indicator B (planned harvest in relation to spring population) is above the established maximum standard – which in this case is 30% [Zalewski et al. 2001]. An analysis of indicator C (exploitation of the population) brings even more alarming results, questioning the appropriateness of the realized game management – the reduction of population was realized in game planning in 16 forest divisions out of the 27 under analysis (59%). These unfavourable tendencies are slightly compensated for by the fact that the users of hunting grounds did not conduct their planned harvesting, which is demonstrated by indicator A (realization of planned harvesting).

Sex structure of culling in the roe deer population in the analysed forest divisions

The analysis of the structure of the roe deer harvest in individual forest divisions (Table 2, Fig. 2) indicates that this harvesting was conducted properly in groups of roebucks and does, although it was too high as regards kids. Improper culling of roebucks was observed in the Forest Division of Młynary – 51.43% and Spychowo – 50.12%. Too many kids were harvested in the Forest Division of Dobrocin – 34.14%, while the culling rate for does was too low – 31.52% [Rozwałka et al. 1997].

Table 2. Structure of the roe deer harvesting in sex groups in the hunting season of 2001/2002 in the area of the forest divisions of the Olsztyn District of the Polish Hunting Association
Tabela 2. Struktura pozyskania saren w sezonie łowieckim 2001/2002 na terenie nadleśnictw Okręgu Olsztyńskiego PZŁ

No. Lp.	Forest Division Nadleśnictwo	Roe deer, totally Razem sarny	Roebucks Kozły		Does Kozy		Kids Koźlęta	
		n	n	%	n	%	n	%
1	2	3	4	5	6	7	8	9
1	Bartoszyce	461	173	37.53	212	45.99	76	16.49
2	Dobrocin	495	170	34.34	156	31.52	169	34.14
3	Górowo Iławeckie	431	178	41.30	152	35.27	101	23.43
4	Iława	633	265	41.86	276	43.60	92	14.53
5	Jagiełek	148	68	45.95	57	38.51	23	15.54
6	Jedwabno	182	81	44.51	82	45.05	19	10.44
7	Korpele	447	184	41.16	193	43.18	70	15.66
8	Kudypy	518	221	42.66	236	45.56	61	11.78
9	Lidzbark Welski	30	14	46.67	12	40.00	4	13.33
10	Maskulińskie	164	68	41.46	70	42.68	26	15.85
11	Miłomłyn	440	189	42.95	200	45.45	51	11.59
12	Młynary	35	18	51.43	13	37.14	4	11.43
13	Mrągowo	592	210	35.47	266	44.93	116	19.59
14	Nidzica	345	144	41.74	148	42.90	53	15.36
15	Nowe Ramuki	113	41	36.28	41	36.28	31	27.43
16	Olsztyn	247	86	34.82	106	42.91	55	22.27
17	Olsztynek	541	228	42.14	210	38.82	103	19.04
18	Orneta	233	94	40.34	88	37.77	51	21.89
19	Spychowo	405	203	50.12	153	37.78	49	12.10
20	Srokowo	450	188	41.78	178	39.56	84	18.67
21	Stare Jabłonki	154	52	33.77	76	49.35	26	16.88

Table 2 – cont.

| 1	2	3	4	5	6	7		9
22	Strzałowo	367	147	40.05	191	52.04	29	7.90
23	Susz	556	221	39.75	226	40.65	109	19.60
24	Szczytno	202	80	39.60	88	43.56	34	16.83
25	Wichrowo	460	172	37.39	197	42.83	91	19.78
26	Wielbark	95	45	47.37	37	38.95	13	13.68
27	Wipsowo	921	334	36.26	405	43.97	182	19.76
Total – Ogółem		9 665	3 874	40.08	4 069	42.10	1 722	17.82
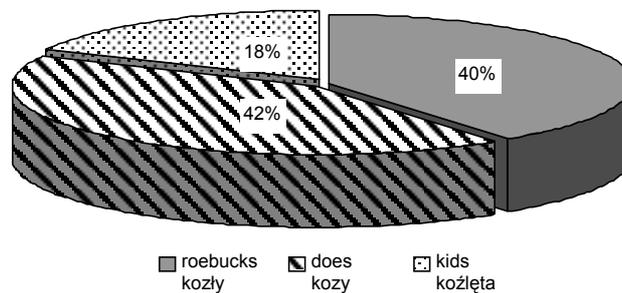
Fig. 2. Culling ratio of roe deer in sex and age groups in the hunting season 2001/2002
Rys. 2. Procentowy odstrzał saren w grupach płciowo-wiekowych w sezonie łowieckim 2001/2002

A clearly improper culling ratio of over 20% of kids was also noted in the following forest divisions: Nowe Ramuki – 27.43%, Górowo Iławeckie – 23.43%, Olsztyn – 22.27% and Orneta – 21.89%. The most favourable structure of culled kids was achieved in the Forest Division of Jedwabno – 10.44%. However, taking into consideration the presence of wolves in this area, this result does not imply that the rate was low for the population inhabiting this area. A similar situation was observed in the Forest Division of Strzałowo, where, as it is assumed, the lynx has settled permanently.

Age structure of realized culling in the population of roebucks in the forest divisions of the Olsztyn District of the Polish Hunting Association

While examining the issue of rational game management related to the harvesting of roebucks in age classes in the season 2001/2002 in the forest divisions of the Olsztyn District of the Polish Hunting Association (Table 3), the Forest Division of Miłomłyn must be noted for its proper ratio of culling roebucks, which is 50% of males in age class I and 50% of males in age class II. A ratio that was close to the proper harvesting of males in age classes was also noted in the Forest Division of Szczytno: culling 50% males in age class I and 50% in age class II. However, the cull of roebucks was inconsistent with

Table 3. Structure of roebuck harvesting in age classes in the hunting season of 2001/2002 in the area of the forest divisions of the Olsztyn District of the Polish Hunting Association
Tabela 3. Struktura pozyskania saren kozłów w klasach wiekowych w sezonie łowieckim 2001/2002 na terenie nadleśnictw Okręgu Olsztyńskiego PZŁ

No. Lp.	Forest Division Nadleśnictwo	Roebucks, total Kozły, razem	Class I I klasa		Class II II klasa	
		n	n	%	n	%
1	Dobrocin	151	74	49.01	77	50.99
2	Górowo Iławeckie	23	5	21.74	18	78.26
3	Iława	189	98	51.85	91	48.15
4	Jagiełek	43	20	46.51	23	53.49
5	Jedwabno	54	17	31.48	37	68.52
6	Maskulińskie	63	29	46.03	34	53.97
7	Miłomłyn	76	38	50.00	38	50.00
8	Mrągowo	196	106	54.08	90	45.92
9	Nidzica	91	53	58.24	38	41.76
10	Olsztyn	21	10	47.62	11	52.38
11	Olsztynek	182	92	50.55	90	49.45
12	Orneta	116	48	41.38	68	58.62
13	Spychowo	127	54	42.52	73	57.48
14	Srokowo	167	115	68.86	52	31.14
15	Stare Jabłonki	48	23	47.92	25	52.08
16	Strzałowo	41	16	39.02	25	60.98
17	Susz	30	18	60.00	12	40.00
18	Szczytno	60	30	50.00	30	50.00
19	Wichrowo	129	72	55.81	57	44.19
20	Wielbark	44	23	52.27	21	47.73
21	Wipsowo	248	133	53.63	115	46.37
	Total – Ogółem	2 099	1 074	51.17		48.83

the regulations in force at that time in the Forest Division of Górowo Iławeckie, where 21.74% of bucks were harvested in age class I and 78.26% in age class II. Similarly, in the Forest Division of Jedwabno, 31.48% shot roebucks belonged to age class I and 68.52% to age class II. In 12 forest divisions out of 22 under analysis (55%), the harvesting of roebucks in age class I amounted to 50% or more, and sometimes it reached almost 69%, as in the Forest Division of Srokowo. This must be perceived as an alarming situation, especially bearing in mind the fact that commissions responsible for assessing the compliance with male culling make the most mistakes by overestimating the age of

roebucks in their third year and classifying them as fourth year, and therefore including them into age class II. This suggests that the unfavourable age structure of the roebuck harvesting can be actually even more disadvantageous, and the attainment of the target level, for example 40% males in class I and 60% in class II, is still quite far away [Zalewski 2002].

Characteristics of the carcass weight, the gross weight of spikes and the form of antlers of roebucks shot in the Olsztyn District of the Polish Hunting Association

In order to characterize the quality of the roebuck population in the Olsztyn District of the Polish Hunting Association (Table 4) the parameters of antlers and the carcass weights were analysed. In the season 2001/2002, the carcass weight of the males in the first age group (in their 2nd year) averaged 15.2 kg, with a standard deviation of 2.0 kg.

Table 4. Characteristics of the carcass weight, the gross weight of spikes and the form of antlers of roebucks shot in the season 2001/2002 in the Olsztyn district of the Polish Hunting Association
Tabela 4. Charakterystyka masy tuszy, masy parostków i formy poroża sarn rogaczy odstrzelonych w sezonie 2001/2002 w Okręgu Olsztyńskim PZŁ

Age group Grupa wiekowa	Statistics Miara statystyczna	Carcass weight, kg Masa tuszy, kg	Spikes weight, g Masa parostków, g	Number of tines Liczba odnóg, szt.
2nd year 2. rok życia I	n	693	693	693
	$\bar{x}$	15.2	158.6	2.6
	s	2.0	47.8	0.9
3rd year 3. rok życia II	n	381	381	381
	$\bar{x}$	16.1	206.5	3.6
	s	2.2	52.9	1.3
4th-5th year 4.-5. rok życia III	n	696	696	696
	$\bar{x}$	17.5	267.4	4.8
	s	2.7	66.0	1.2
6th year and older 6. rok życia i więcej IV	n	332	332	332
	$\bar{x}$	18.0	320.6	5.2
	s	2.1	82.5	1.2

On average, the weight of spikes in the first age group was 158.6 g, with a deviation of 47.8 g. A statistical male shot in this group was a spike-antlered buck or an irregularly fork-antlered buck. This results from the statistical number of tines in antlers, amounting to 2.6.

The weight of carcass in the second age group averaged 16.1 kg, with a deviation of 2.2 kg. The average weight of spikes was 206.5 g. A statistical male in its third year was an irregularly or regularly fork-antlered buck ($\bar{x}$ = 3.6 tines). The parameters concerning the weight of spikes and the form of antlers in the first and the second age group clearly prove the necessity of introducing an individual selection of animals within hunting plans in two groups, while differentiating the rules for selection for age groups I and II of

roebuck. This has not been done in many recent seasons, since the rules have been the same for the entire age class (class I) of roebucks. From the point of view of individual selection, this rule was undoubtedly wrong.

In the third age group, as follows from the conducted analysis, the average weight of carcass assumed the value of 17.5 kg, at s = 2.7. The average weight of spikes in this age group was 267.4 g, at s = 66.0 g. On average, a culled roebuck was in its 4th – 5th year, it was a regularly fork-antlered buck or an irregularly six-point-antlered buck, with x = 4.8. In the fourth age group (from the 6th year on), the average weight of carcass amounted to 18.0 kg, at the standard deviation of 2.1 kg.

The average weight of spikes in this group was 320.6 g at s = 82.5. The average number of tines in the fourth age group was 5.2. This indicates that, statistically, a culled roebuck in this age group was an irregularly six-point-antlered deer.

SUMMARY AND CONCLUSIONS

On the basis of the performed analysis of annual hunting plans and assessments of the compliance of roebuck culling for the season 2001/2002, it is possible, upon the examination of the realization of the game management in the roe deer population in the Olsztyn District of the Polish Hunting Association, to draw the following statements and conclusions:

1. In 16 forest divisions (59%), out of 27 divisions under analysis, a reduction of population was achieved in game management.

2. The roe deer harvesting in individual forest divisions, as can be generally claimed, was conducted properly, particularly in groups of roebucks and does; however, it was too high as regards kids, ranging from 7.9% to 34.14%.

3. In 12 forest divisions (55%), out of 22 analysed in this aspect, roebuck harvesting in their age class I was between 50% and 69%. The unfavourable age structure of roebuck harvesting can be, actually, even more improper, and the attainment of the target level can be a distant prospect for many hunting grounds.

4. The parameters of the weight of spikes and the form of antlers in the 1st and 2nd age groups clearly indicate the necessity of carrying out the selection of individual animals within realized hunting plans in two groups and to differentiate the selection rules for 1st and 2nd age groups of roebucks.

5. Roebucks in their 6th year and older reached the average weight of carcass of 18.0 kg (s = 2.1 kg). The average weight of spikes in this group was 320.6 g at s = 82.5, and statistically, a culled roebuck in the analysed period was at least an irregularly six-point-antlered deer.

REFERENCES

Rozwałka Z. et al., 1997. Ramowe zasady gospodarowania populacjami zwierząt łownych. Wyd. Dyr. Gen. Lasów Państw.
Stachowiak I., 1994. Wycena trofeów łowieckich. Wyd. SGGW Warszawa.
Varićak V., 2000. Trophäenbewertung. Edition Hubertus. Österreichischer Agrarverlag Wiedeń.

Zalewski D., Szczepański W., Janiszewski P., Konstantynowicz M., 2001. Baza danych do wdrożenia monitoringu podstawowych gatunków zwierząt łownych i bobra na terenie województwa warmińsko-mazurskiego. Wyd. UWM Olsztyn.

Zalewski D., 2002. Stan i perspektywy gospodarowania łowieckiego gatunkami zwierzyny grubej w województwie warmińsko-mazurskim. In: Materiały konferencyjne. Sarnówek.

Zasady gospodarowania populacją sarny w dużych kompleksach leśnych. 2001. Generalna Dyrekcja Lasów Państwowych Warszawa.

JAKOŚĆ SARNY EUROPEJSKIEJ (*CAPREOLUS C. CAPREOLUS* L.) ORAZ OCENA ZABIEGÓW HODOWLANO-ŁOWIECKICH REALIZOWANYCH W JEJ POPULACJI W NADLEŚNICTWACH POŁOŻONYCH W OKRĘGU OLSZTYŃSKIM PZŁ

Streszczenie. Celem pracy było zaprezentowanie jakości osobniczej sarny europejskiej oraz ocena zabiegów hodowlano-łowieckich realizowanych w jej populacji w nadleśnictwach położonych w Okręgu Olsztyńskim PZŁ. Zgromadzone dane pochodzą z rocznych planów łowieckich (RPŁ) na sezon 2002/2003 oraz z oceny prawidłowości odstrzałów samców zwierzyny płowej za sezon łowiecki 2001/2002. Materiał statystyczny zebrano w odniesieniu do 203 obwodów łowieckich. Posłużył on do wyliczenia w ramach nadleśnictw wskaźników hodowlanych oraz parametrów jakości osobniczej sarny, w tym m.in. formy poroża, średniej masy tuszy i masy parostków brutto.

Słowa kluczowe: sarna, *Capreolus capreolus*, poroże, gospodarka łowiecka