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Thematic cycle 6 «Hunting Guns and Ammunitions»





Hunting Guns and Ammunitions

1. General description of the hunting gun

1.1 Definition

Firearms are called the guns in which the launching of the projectiles is driven by the energy generated by combustion of propellant within an ammunition cartridge. They are thus "internal combustion engines" which convert the heat generated from the combustion of the gunpowder into kinetic energy which, when attributed to the projectile or the shots of the charge, will send them from the gun to the game's body in order to overwhelm it.

Hunting gun is a firearm intended to be fired from the shoulder which has a fixed stock, a barrel length of at least (50) cm and a total length of at least (1) meter which is completely smooth on the inside*.

(*) There are also hunting guns with a rifled barrel. However, their use for hunting is not currently permitted by Greek law; hence we will not refer to them at this point.

1.2 Types of shotguns

Shotguns are distinguished in two categories depending on how the barrel is con-



nected to the action: Break-action shotguns and repeating and semi-automatic shotguns.

1.2.1 Break-action shotguns are those in which the barrel or barrels are connected with the action with a hinge pin and rotate perpendicularly to the bore axis to expose the breech and allow loading and unloading of cartridges, which are placed by hand directly into the chamber.

Break-action shotguns are distinguished in:

• Single –barrel shotguns: Are the shotguns with one barrel (Fig. 2.2)



Fig. 2.2 - Single-barrel shotgun

- Double-barreled shotguns: Are the shotguns with two barrels and are subdivided in:
- Side by side shotguns: Barrels are placed next to each other (Fig. 2.3).



Fig. 2.3 - Side by side shotgun

- Over/under shotgun: Barrels are placed one above the other. They are usually called with the corresponding French term "Super Pose" (Fig. 2.4).
- **1.2.2** Repeating or semi-automatic shotguns are shotguns whose barrel is attached to the action, fixed, and the cartridges are firstly placed in the magazine and then a specific mechanism impels them into the chamber and while it also activates the firing mechanism. They are distinguished in:



Fig. 2.4 - Over/under shotgun or Super Pose

- **Repeating**: These are the shotguns where, after each shot, the propulsion mechanism which impels the cartridge from the magazine to the chamber, as well as the extracting mechanism of the shells and the firing mechanism are operated manually by the operator. In this category belong:
- Shotguns which are loaded when the hunter pumps the forearm between shots. They are called pump-action or slide-action (Fig. 2.5).
- Bolt action shotguns which load the shells for you. When you work the bolt a shot-shell goes into the chamber and the empty shell comes out (Fig. 2.6).
- Lever action shotguns which use a lever located around the trigger guard area to load fresh cartridges into the chamber when the lever is worked (Fig. 2.7)
- Semi-automatic or self-loading: These are the shotguns where, after each shot, the propulsion mechanism which impels the cartridge from the magazine to the



Fig. 2.5 - Pump-action shotgun

chamber, as well as the extracting mechanism of the empty cartridges and the firing mechanism operate automatically, taking advantage of the energy produced by the

combustion of the gunpowder while with every pull of the trigger only one cartridge is fired (Fig. 2.8).



Fig. 2.6 - Bold-action shotgun



Fig. 2.7 - Lever action

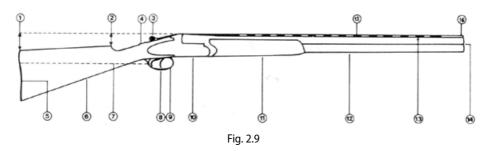
1.3 The basic parts of a hunting gun - description

• Stock. At the back of the weapon is the stock with which the hunter mounts the weapon so that the barrels of the gun are aligned with the target. The stock is made of wood, usually walnut wood and rarely beech wood in cheaper constructions or of synthetic material (plastic). On the back it has a suitably shaped plug-in, the butt



Fig. 2.8 - Semi-automatic or self-loading

Fig. 2.9 Main parts of a firearm: 1. Big inclination, 2. Small inclination, 3. Bolt handle, 4. Safety, 5. Butt, 6. Stock, 7. Stock length, 8. Trigger, 9. Trigger guard, 10. Action, 11. Forestock, 12. Barrels, 13. Rib support, 14. Muzzle, 15. Rib, 16. Sight



plate, which has two roles: On the one hand the absorption of part of the recoil due to its elastic construction and on the other hand the good adhesion of the stock to the hunter's shoulder with the appropriate configuration of its surface. In its front part and on the surface just embraced by the hunter's palm the stock carries a dense or sparse engraving, the so-called "straw", which stabilizes the hunter's hand in the right position at the time of the shot.

Stocks are divided in three categories depending on their shape and the point where the shooter's palm is placed:

- English type, which are intended for double trigger shotguns, so that the palm glides back without any problem when moving the forefinger from one trigger to the other.
- Pistol type, which are intended for single trigger shotguns and offer the shooter a



Fig. 2.10 - Stock type - 1. Semi Pistol, 2. Pistol type, 3. Monte Carlo, 4. English type

better sense of grip than the previous ones.

- Semi-pistol type, which are an intermediate category combining the advantages and disadvantages of the two previous categories.

There are also other categories of stocks which are used in specific cases, like the «Monte Carlo» which are used in trap guns, the Bavarian which are used in firearms for big game, the swan neck guns, etc.

• Action. Right in front of the stock is the action of the gun which contains the firing mechanism (trigger, sear, hammer, firing pin, cocking rod, etc.) in break-action shotguns or the propulsion mechanisms which lead the cartridge from the magazine to the chamber, the extraction mechanism of the empty cartridge and the firing mechanism, in repeating and semi-automatic shotguns. The trigger is attached to the action, while protected from the trigger guard, as well as the safety which varies depending on the manufacturer.

- Firing mechanism.

It consists of the trigger, the sear, the hammer and the firing pin.

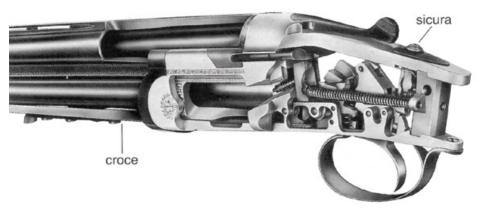


Fig. 2.11 - Firing mechanism in over/under shotguns

- Loading.

- a) Break-action shotguns. In break-action shotguns the loading i.e. the placement of cartridges in the chamber is done manually.
- b) Repeating or semi-automatic shotguns. In repeating or semi-automatic shotguns the first cartridge is placed in the chamber and the other two in the magazine. After the first shot in the semi-automatic shotguns the discharge of the empty cartridge is done automatically while the next cartridge is passed from magazine to the chamber also automatically. In repeating shotguns this procedure is carried out manually as the operator moves the loading lever.

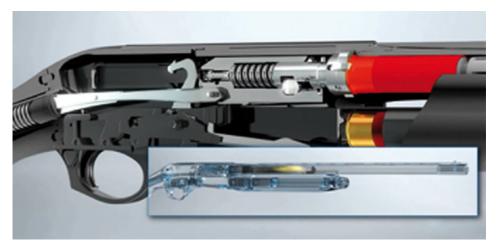


Fig. 2.12 - Shotgun operation mechanism

- Action and barrel locking.

The locking between the barrel and the action is very important because it is what gives robustness to the gun as a construction and will not allow gas to escape back during detonation.

- a) Break-action shotguns. In break-action shotguns this locking is achieved with the so called "keys" and the opening with the help of the bolt handle, which is rotated by the operator with its thumb. The rotating movement of the barrel or barrels around the central pin (hinge), without the gun being solved, is accomplished with the help of the forestock.
- b) Repeating or semi-automatic shotguns. In repeating or semi-automatic shotguns the locking is done with the bolt assebbly which, when "closed", is hooked to the "tail" of the barrel with a specially constructed "key", which is being unlocked by pulling the loading lever that opens the bolt assembly.
- The extractor is a hook device which pulls the case out of the chamber as the breech mechanism is opened.
- a) Break-action shotguns. In single –barrel and double-barreled shotguns there are two types of extractors:
 - I) Simple. Upon opening the gun they slightly pull the case from the chamber and the operator then pulls it with his hand.
 - II) Automatic. Upon opening the gun they eject the case violently out of the chamber.
- b) Repeating or semi-automatic shotguns. In repeating or semi-automatic shotguns the extractor is mounted on the front part of the bolt assembly, so when it moves backwards, it pulls the case from the chamber and discards it out of the gun action (oblique).

- The safety. The safety of hunting weapons is a button mounted on the action of the shotgun and more specifically in break-action shotguns it is usually behind the bolt handle, while in repeating or semi-automatic shotguns at the trigger guard.

Attention! The security of most guns (of low and medium quality) secures only the trigger and not the hammers, and so the gun might go off with a loud strike. The really safe gun is that, which is not only "empty" but also "open" if it is a break-action shotgun or with an open bolt assembly if it is a repeating or semi-automatic shotgun.

Barrel

- General characteristics.

In front of and attached to the action is the barrel (or the barrels if it is a double-barreled shotgun) which in break-action shotguns is attached to the action with the help of special components of the lock mechanism, while in repeating or semi-automatic shotguns it is fixed on the upper part of the action and secured with a special ring which is attached to it (barrel) and embraces the tubular magazine at the end of which a nut is screwed in order to stabilize it.

The role of the barrel is to lead the projectile or the shots in the first few centimeters of their route and to give them a straight path to the target.

They are made of special steels, usually nickel-chrome-lead, while in many guns they are internally chrome coated to protect against erosion.

In commercial shotguns, the length of the barrel ranges from 51 to 91 cm. Shotguns with a barrel length of 51-61 cm are intended for hunting in forests (woodcock, wild boar), 66-71 cm for general use and 76-91 for hunting ambushed (wood pigeon, waterfowl, thrushes etc.)

- The inner part of the barrel.

According to fig. 2.13 inside the barrel there are:

1) The chamber which is the space the cartridge is placed. Its length is 65 mm (2½'') or 70 mm (2¾'') for simple firearms and 76 mm (3'') for magnum firearms. Today there are also 89 mm (3½'') chambers in the so called "super magnum" firearms. The magnum and super magnum firearms use cartridges which for the same caliber

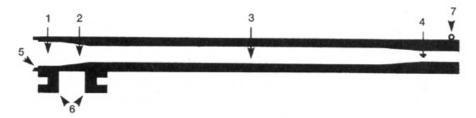


Fig. 2.13 - The Barrel

- have charges with greater powder and shot weight and which can have results at marginal distances for simple firearms.
- 2) The adaptive cone. It is the cone which is the transition from the chamber to the bore of the barrel. The adaptive cone help the lips of the case to unfold when the cartridge is fired so that the shots can pass smoothly from the cartridge to the bore of the barrel and prevent leaking of gases before them.
- 3) The bore which is the tunnel down the barrel of a firearm through which the projectiles travel and has generally a cylindrical shape.
- 4) The choke. In the last 5 cm of barrel there is a conical configuration of the bore of the barrel, which ends again in a cylindrical shape just before the muzzle and which narrows the diameter of the bore from 0.1 to 1.2 mm. This configuration is made to give the shots a more oblong beam resulting in greater concentration in the target and thus greater effective range.

Suggested use of chokes:

- Cylinder or improved cylinder for hunting in forests
- Modified choke to full choke in open fields
- ¾ or full choke for hunting in swamps

Useful information about chokes:

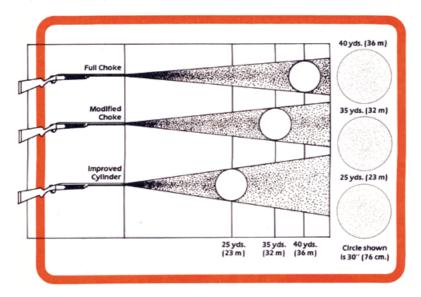
- In side by side shotguns usually the right barrel which corresponds to the first trigger has a wider choke than the left. In over/under shotguns usually the lower barrel which corresponds to the first trigger has the widest choke. Thus, the barrel corresponding to the second trigger always has the greatest effective range.
- Specialized gunsmiths can adjust the chokes of a firearm provided that the barrels are not internally chrome-plated.

Choke name	Constriction (mm)	Common identifications	Ballistic efficiency*	
Cylinder Choke	0	Cyl ή *****	40%	
Improved Cylinder or 1/4	0,1 - 0,3	lmp. Cyl. ή ****	50%	
Modified Choke or 1/2	0,4 - 0,6	Mod ή ***	60%	
3/4	0,7 - 0,8	Imp. Mod or **	65%	
Full Choke	1	Full or *	70%	

Table 2.1 Ballistic efficiency of the main chokes in Cal. 12

^{*} Ballistic efficiency is the percentage of shot in 76 cm circle after a shot with a load of 32 gr shots No 5 or 3 at 36 m.

- Available on the market are also firearms with interchangeable (screwed) chokes, internally or externally.



The outer part

- 1. The extractors. The extractors are attached on the barrel or barrels only in break-action firearms, whose function is described above.
- 2. The lock mechanism. On the barrel or barrels of the firearms are also the "keys" with which the barrel is locked to the action in break-action shotguns or the barrel with the bolt assembly in repeating or semi-automatic shotguns. Their function has been described above.
- 3. Sighting devices
 - The rib. On the upper part of the barrel of single-barrel shotguns, of over/under shotguns and of repeating and semi-automatic shotguns we usually find the rib, which aids in targeting, offering a better field of view. In side by side shotguns the rib is located between the two barrels.
 - The sight. At the front part of the rib, near the muzzle, is the sight positioned which helps the shooter align the barrel of the firearm with the target.
 - Rifle sights. There are shotguns which are constructed for slugs and their barrels
 are constructed with particular specifications for that purpose. These barrels do
 not have the classic rib but manufacturers have installed metal sighting devices of
 rifled firearms i.e. front and rear sight. These barrels are known as «slug».
 - The forestock or forearm. It is the wooden or the plastic part of the firearm which is attached in various ways to the bottom of the barrel or the barrels and its role

is to provide a handle to the shooter and help him to direct his firearm to the target. The forestock carries a "straw" engraving at the point where the shooter's hand embraces it, thus offering a better grip.

2. Calibers

Caliber is the inside diameter of the barrel and more specifically the diameter of the bore. The caliber of smoothbore firearms is not expressed in metric units of length (mm) neither in English units (inches). It is measured in Cal. (Calibre). The most common calibers are: Cal. 12, 16, 20, 28, 32 and 36. There are also the: Cal. 8, 10 and 24 which are scarcer. In America the Cal 36 is also called 410 because the diameter of the bore of this caliber is equal to 0,410°.

In order to understand what Cal means let's give an example: Cal 12 is the diameter of a sphere (ball) of pure lead that weights 1/12 of a libre (1 libre = 453,6 gr) that is 453,6:12 = 37,8 gr. A sphere of pure lead that weights 37,8 gr goes just through a Cal.12 barrel. As can be seen the Cal 16 is narrower than the Cal 12, the Cal 20 narrower than the Cal 16, and so on. The basic difference between calibers is that the

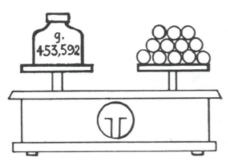


Fig. 3.1 12 Cal 12 balls = 1 libre

biggest have the ability to shoot heavier loadings in shots than the smaller. In both small and large calibers, however, there are advantages and disadvantages. For example, the advantage of large calibers is the generally good distributions their barrels achieve, while an advantage of smaller calibers is the lighter firearm construction and the reduced kick.

3. Ammunition

3.1 Cartridges

Description. The cartridge of smoothbore firearms (Fig. 4.1) consists of:

- 1. A plastic or paper casing.
- 2. A cylindrical metal part, the brass head, which end ups in a rim, so that extraction can be achieved.

The brass head and the casing constitute the case. It is the part of the cartridge which remains in the chamber after the shot. The cases, irrespective of the caliber, have a length similar to the chamber for which they are intended. Thus we have cases from 65 to 70 mm in length for 70 mm ($2\frac{3}{4}$) barrels, 76 mm for barrels of 76 mm ($3\frac{4}{12}$ "magnum") and 89 mm for barrels of 89 mm ($3\frac{1}{12}$ "super magnum").

Attention: We can use cartridges of smaller length in a larger chamber. The opposite

is prohibited. There is a risk of damage to the gun or even the rupture of the barrel. Manufacturers write on the barrel the length of the chamber and the caliber e.g. Cal. 12 - 70 or 12 - 234 so that such mistakes can be avoided.

- 3. The primer in the centre of the brass head, which is hit by the firing pin of the firearm.
- 4. The seal, which is either made with a 1 mm disc-shaped cardboard and spinning the lip of the case or a star-shaped thermal "folding" of the lip of the case.
- 5. The powder charge, which is in contact with the primer and is ignited by it at a time of 1/1000 of a second.

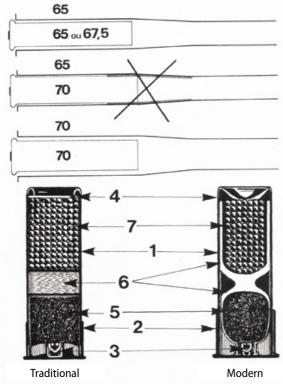


Fig. 4.1 The seal

6. The wad, which is between the shots and the powder. It is the part which, driven by the pressure of the gases produced by the burning of gunpowder, pushes the shots to the muzzle of the barrel and prevents the passage of gas towards the shots at the same time.

The wads are distinguished in traditional wads which are made of wool or paper mache and contemporary wads which have the form of a cup and are made of polyethylene. Contemporary wads, the so-called concentrators give better ballistic performance both in concentration and distribution.

7. The shots, which are located on the upper part of the cartridge, between the wad and the seal, and are those that will leave the barrel and travel

towards the target in order to strike it. In the cases the wad is a concentrator, most of the shots are in there and thus their friction with the inner walls of the barrel is avoided.

8. The dispersant, which is a plastic cross-embedded arrangement, which is inside the concentrator and is intended to increase the dispersion of the shots in close distances, like e.g. in woodcock hunting. The effectiveness of the dispersant is greater in barrels with a smaller choke.

Function. After the hit of the firing pin on the primer, a powerful spark is produced, which causes the powder to ignite violently i.e. to explode and produce a large amount of gas. Because these gases are in a confined space (cartridge), they develop very strong pressure. The gas pressure pushes the wad and this in turn the shots, which open the seal of the cartridge and move to the muzzle of the barrel at high speed.

3.2 Shots

General Characteristics. The shots are numerous tiny balls of generally spherical shape contained in the same charge. With a few exceptions (cubic or lenticular shots, rubber shots), they are absolutely spherical in shape and are usually made of lead and antimony alloy and can be nickel-plated or copper-plated to achieve greater perforation. There are also lead shots for special uses produced, especially for hunting in swamps, where lead might cause lead poisoning to ducks. The charge weight is not constant in the same caliber but ranges within limits defined by international practice and which are related to the resistance of the guns and length of the chamber.

Table 4.1 Weight of shot charge of different calibers depending on the chamber length.

	Chamber length						
Caliber	65 - 70 mm ή 2 ½′′ - 2 ¾′′ normal	70 mm ή 2 ¾′′ Semi magnum	76 mm ή 3′′ Magnum	89 mm ή 3½′′ Super magnum			
12	28* - 36 gr	36 - 40 gr	40 - 52 gr	52 - 64 gr			
16	24 - 32 gr	_**	-	-			
20	21 - 28 gr	-	28 - 36	-			
24	18 - 25 gr	-	-	-			
28	16 - 21 gr	-	-	-			
32	12 - 15 gr	-	-	-			
36	8 - 15 gr	-	16 - 21	-			

^{*} Cal 12 cartridges which are intended for Trap shooting have a shot charge of 24 gr, as it is stipulated by the rules of the sport.

The numeration of shots.

Shots are standardized in numbers from 0 to 12 with smaller numbers indicating larger shot. Between two consecutive numbers the difference in diameter is 1/4 of a

^{**} The dash means that there is no corresponding charge in this the caliber.

millimeter. The heavier the loading is, the more shots of the same number it gets, and the bigger the shots are and hence the smaller their number, the fewer shots gets the loading of the same weight.

Table 4.2 Name and diameter of the shots with the standardization of different countries.

	ITALY	EN	IGLAND	ı	FRANCE	GI	RMANY		USA
No	Diameter (mm)	No	Diameter (mm)	No	Diameter (mm)	No	Diameter (mm)	No	Diameter (mm)
12	1,50	12	1,57	12	1,25	12	1,25	12	1,27
11	1,70	11	1,67	11	1,50	11	1,50	11	1,52
10	1,90	10	1,78	10	1,75	10	1,75	10	1,78
9,5	2,00	-	-	-	-	-	-	-	-
9	2,10	9	2,03	9	2,00	9	2,00	9	2,03
-	-	-	-	8,5	2,10	-	-	-	-
8	2,30	8	2,21	8	2,25	8	2,25	8	2,29
7,5	2,40	-	-	7,5	2,40	T7	2,41	7,5	2,41
7	2,50	7	2,41	7	2,50	7	2,50	7	2,54
6	2,70	6	2,59	6	2,75	6	2,75	6	2,79
5	2,90	5	2,79	5	3,00	5	3,00	5	3,05
4	3,10	4	3,05	4	3,25	4	3,25	4	3,30
3	3,30	3	3,25	3	3,50	3	3,50	3	3,56
2	3,50	2	3,43	2	3,75	2	3,75	2	3,81
1	3,70	1	3,63	1	4,00	1	4,00	1	4,08
0	3,90	0	3,91	0	4,25	0	4,25	0	4,33
2/0	4,10	BB	4,09	-	-	-	-	ВВ	4,60
3/0	4,30	BBB	4,32	-	-	-	-	-	-

Options

- **Depending on the barrel**: Generally we use a cartridge with thinner (bigger No) shots for the first shot and thicker for the second or third (of we have a self-loading gun) in order to have a greater shooting range in the second and third shot.
- **Depending on the season**: We use thicker shots for the same game if we hunt it in winter than in summer because in winter furred game has thicker coats while feathered game has richer plumage.

• Depending on the game: In the following table can be seen the proposed shots numbers and charge weights in Cal 12, for different game species. The fluctuations we see are proportional to the choke of the barrel and the expected distance from which we usually shoot these game species.

Table 4.3 Suitable shot number and shot charge of Cal 12 for different game species

GAME	SHOT No	CHARGE WEIGHT
HARE	3 - 4 - 5	35 - 37 gr.
EUROPEAN RABBIT	7	34 - 36 gr.
GOOSE	0 - 3	36 - 52 gr.
DUCK (BIG)	4-5-6	36 - 42 gr.
GARGANEY	6-7	33 - 35 gr.
PARTRIDGE	6-7	33 - 35 gr.
EURASIAN WOODCOCK	8 - 9	32 - 34 gr.
NORTHERN LAPWING	7	32 - 34 gr.
COMMON WOOD PIGEON	5-6	34 - 42 gr.
TURTLE DOVE	7 - 8	31 - 33 gr.
THRUSH	9 - 10	30 - 32 gr.
COMMON QUAIL	8 - 11	30 - 32 gr.

• **Depending on the type of shot**: When game species are in motion they are more vulnerable than when standing still and especially feathered game, because when they fly they expose a greater part of their body volume to the beam of shots. So when we shoot at a sitting duck for example we need to use shots that are a number thinner than that we were going to use if it was flying.

3.3 The chevrotines (buckshots)

General Characteristics

The chevrotines or buckshots are pellets (balls) of such diameter that they do not fit into the classical classification and numeration of shots and can in no way be considered as shots as they have a totally different ballistic behavior. Their diameter range from 5 to 9,6 mm. Usually they are made of lead and can be either nickel-plated or copper-plated. Less frequently they are made of alloys other than lead. Cartridges which have a charge of buckshots are usually called on the market by the number of pellets they bear e.g. 8 buck, 9 buck etc.

The standardization of different countries of chevrotine definitions is given in the following table.

Table 4.4 Commercial name and diameter of chevrotines with the standardization of the different countries

Diameter (mm)	ITALY	ENGLAND	FRANCE	GERMANY	USA
5,00	5/0		4/0	4/0	T
5,16		AAA			
5,25				5/0 ή 43G	
5,60	6/0		CA B	6/0	F
6,10					4 BK
6,20	7/0		C4	27G	
6,35					3 BK
6,80	8/0	SSG	G	P.V ή 20G	2 BK
7,40	9/0				
7,50				P.IV	
7,62			C1 B		
7,90			C1 B		
8,00	10/0				
8,13					0 BK
8,40	ΛΑΓΟΣ	SG		9G	00 BK
8,60	11/0		C 1	P.III	
9,14		LG			000 BK
9,60					0000 BK

Options

Buckshots are used for small and medium distance shots in large furred game hunting. In our country they are used extensively in wild boar hunting since they are the only big game hunted in open hunting grounds. Buckshots do not behave ballistically like shots, while at short distances, i.e. up to 10 m, they have the same power as the slug. Under no circumstances do they create a so-called "water hammer" such as slugs or rifle bullets, but the multiple wounds they cause are equally drastic as long as they are fired from a short distance in order to maintain high speed, which will also provide the necessary perforation.

For wild boar, regarding the conditions under which we hunt in our country, it is advisable to use buckshots with a diameter of at least 8.4 mm and not less. Conventional commercially available 70 mm cartridges contain 9 buckshots of 8.4-8.6 mm, 9 buckshots of 9.14 mm or 6 buckshots of 9.6 mm. There are, of course, semi magnum and magnum versions that have proportionally more buckshots. However, this ammunition must not be applied to wild boars when being more than 30 m apart.

3.4 Slugs

General Characteristics

There are many types of bullets on the market for this purpose, which differ in shape and in length. The main types are:



Balles: SLUG, Blondeau, Gualandi, Sauvestre,

Fig. 4.2 - Different types of slugs: Foster, Blonteau, Gualandi, Sauvestre, Brenneke & Brenneke Cal.36

- The traditional bullet, which is a solid sphere (ball) made of lead with a diameter slightly smaller than the diameter of the barrel. The Cal. 12 for example has a diameter of 17,6 mm and weights approximately 33 gr. This type of bullet is the most ancient form of firearm bullets and has been used exclusively for more than three centuries.
- The Brenneke slug with the characteristic spiral ribs and the directional woolen or plastic plug that is screwed on its back.
- The Foster slug, which is bell shaped and has also characteristic spiral ribs.
- Sabot bullets, which have a much smaller diameter than that of the barrel. These bullets are surrounded by a synthetic cylindrical shell with an outer diameter equal to the diameter of the barrel adjacent to it in order to travel through the barrel.

Upon leaving the barrel the shell is discarded and the bullet travels alone by being less impeded by the air resistance due to its smaller diameter. This way it maintains its velocity for a longer distance and achieves a more linear path. The shell also has a plug role.

Options

- We must always use the proper slug for our firearm in order to achieve the best results and not change it frequently. In order to find it, we need to take test shots and choose the one that will succeed in scoring 5 shots in a circle of 20 centimeters from a distance of 75 meters
- Calibers appropriate for Greek conditions are:
- For Wild boar Cal 12 70 or Cal 12 76
- For roes and chamois in C.H.A. the Cal 20 70 or Cal 20 76
- When using slugs we always have to use barrels with the least possible choke. The best performances are made with the cylinder choke (*****) or the improved cylinder (****)).
- If we often use slugs it is recommended to get either a firearm with a specific barrel for slugs or a replacement barrel for our existing firearm. If we cannot financially afford one of the above solutions we could ask a gunsmith to put on the rib a removable sighting device of rifled firearms (front sight and rear sight). In the above ways we will greatly improve the precision of our firearm when using slugs.

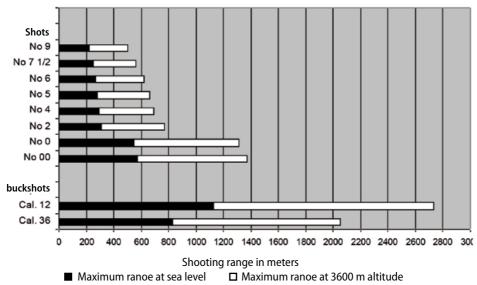
Proper use

- Slug shots should not be attempted at distances of more than 150 m because for longer distances the results are poor both in terms of precision and their kinetic energy.
- When we shoot with a slug we have to be sure about the safe termination of the shot.

4. Shooting ranges

General Information

Shooting range is the line that links the muzzle of the barrel with the ending point of the projectile. By referring to an ending point we mean either the point of the ground where the projectile will strike after its flight, an insurmountable obstacle, or a limit beyond of which the flight of the projectile has no meaning. More simply is the longest distance in which, under given circumstances, a projectile can hit a target. The shooting range depends on many factors the most important of which are: the shooting angle to the horizon, the initial velocity (at the muzzle of the barrel), the diameter of the projectile, the weight of the projectile, the density and speed of the air, the aerodynamics of the projectile etc.



Pict. 5.1 - 1 Maximum range of different shot sizes and slugs

For practical reason for shotguns we distinguish three ranges:

- The effective range which is the longest distance where, when the game is shot with a given shot number, their beam will be of such density that the game will be hit by so many shots that it will be surely overpowered. In practice this distance is 40 m.
- The maximum safety range which is the distance our shots will reach when firing at an angle of + 150 to the horizon. Empirically, this distance is in meters equal to the diameter of the shots in mm x 80. For example, for No. 9 shots having a diameter of 2 mm, this distance is 2 x 80 = 140 m, while for No. 4 shots with 3 mm diameter this distance is 3 X 80 = 240 m. This range also reflects the usual safety distance.
- The absolute maximum range which is the distance our shots will reach when firing at an angle of +450 to the horizon. At this distance, however, as the shots will have travelled a long distance, the air resistance will have slowed them down enough so that they will not have enough energy to cause a serious blow to any individual being within their range. Many times, however, either due to a barrel problem or because of particularity of the cartridge, the shots form agglomerations of sufficient weight which, despite the distance, may cause injury to humans.

This is particularly dangerous when it comes to buckshots or slugs. As shown in Fig. 5.1, the Cal. 12 slug can travel up to 1100 m, while buckshots up to 600 m, at sea level.

Attention! We must not shoot upwards at a big shot angle with buckshots or slugs because we cannot know the point where they are going to reach the ground. We

also have to be sure that at a safe distance, as defined in Fig. 5.1, there is no man, car, tractor, home, animal or anything else that could be damaged by our shot.

5. Shooting

General information

Shooting with a shotgun at a moving target is a process very different from shooting at a fixed target. In order to learn how to shoot at a moving target, we have to forget what we were told in the army and everything we have learned by using air guns in



Fig. 6.1 - Finding your master eye

our childhood.

Firstly we have to take into account three basic principles:

1st. We aim with both eyes open (binocular sighting)

2nd. Sighting at a moving target is "approximate" and in fact it is like keeping track of the target by pointing at it with our forefinger and

3rd. As the moving target is moving leading is always required.

 In order to be able to shoot with the two eyes open we must first define our master eye. In order to do that, we must put our

hands in a position as shown in Fig. 9.1, then aim with both eyes open at an object through the gap created between the two palms and slowly move our hands towards our face. We are going to see that the gap will approach and attach to one of our two eyes. This is our master eye. Having found our master eye, we now know we have to carry our gun on the shoulder of this side. Usually the master eye coincides with the dominant hand, i.e. most right-handed have the right eye as master eye and most left-handed the left eye. With binocular sighting the master eye aims, because it basically controls the target line (eye-sight-target) and the other eye helps to avoid losing the depth of the field, that is, to have a constant sense of distance. Thus, we focus our attention on the target and not the sight, which is the goal when shooting at a moving target.

• The average speed of buckshots travelling towards the target is of the order of 400 m/sec at the muzzle of the barrel and 200 m/sec at 35 m distance. Obviously it takes some time to cover this distance. Furthermore between the moment the brain gives the order to fire until the firing starts (pulling the trigger- hitting the firing pin) and the time the buckshots come out of the barrel there is also some time needed. During this time the target is moving. So, whether the target is flying (birds) or terres-

trial (hare) we never shoot exactly on it but we always shoot a little further ahead of the moving target. This is called "leading". For a particular barrel and a particular cartridge, leading depends on the distance and speed of the target - game and on the angle of its course with respect to the shooter - hunter. For example, when the target moves vertical to the direction of the shot, the leading is as twice as big if the game passes at a distance of 35 m as if it passed at a distance of 20 m.

· Leading methods

There are many leading methods but the most suitable is the "swing through". According to this method from the time he is mounting the gun the hunter swings the muzzle of the shotgun so it points at the flying bird. He follows its flight path, increasing the speed of the swing until the gun muzzle has passed through the bird to a spot just ahead and then fires without stopping the swing after the shot. While "leading" the shooter has to cover the view of the game with the barrel, so that the target appears higher than the game and the shot has a slightly upward course.



Fig. 6.2 - The «swing»

Shooting rules

1. We do not shoot too high or too far behind. We have to bear in mind that the beam of shots is not in the form of a plate but is a beam that resembles a "rugby" ball and

in 35 m it has a diameter of 2,5 m and a length of 4 to 5 m. So if we aim directly at the target or make a small leading, the shots will pass behind the target. If we do an excessive leading, then the target may be hit by the tail of the shot beam.

2. When shooting a flock of birds never point at the flock but always choose a bird and shoot as if it was alone.

6. Maintenance

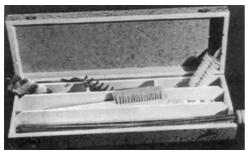


Fig. 7.1 - Case with cleaning set

Our firearm is exposed to dust and often rain while hunting. No matter how good ammunition we use there will always be remains of the burning of gunpowder in the barrel. So it has to be cleaned regularly. How often depends on the type of use, the conditions the gun is exposed to, whether the barrel is chromium coated internally or not and the quality of lubricants we use.

Maintenance tools

The tools that are necessary for the proper maintenance of our firearm are:

- A wooden or metal pull-through for cleaning the barrel
- A wire brush for cleaning the barrel
- Cleaning liquid for the bore of the barrel
- Lubricant
- Pure gasoline or nitro solvent
- Cotton fabric
- A punch of 3 mm
- A series of good quality screwdrivers
- · A brush of 2 cm width

Procedure

Regular maintenance

Firstly we dismantle our firearm and if it is a repeating or semi-automatic shotgun we remove the trigger mechanism with the help of the punch. We lay all the compartments on a table after having put an underlay which can be a tarpaulin, some old fabric or newspapers. We wipe well with the cotton cloth all the parts of the firearm to remove dust and possible humidity. Then with a dry cloth placed on the pull-through we pass the barrel until the fabric comes out clean. Consequently, after wetting a piece of cloth with the lubricant we lubricate the inside of the barrel and then all the

outer metal surfaces of the gun. Then, with clean pieces of fabric, we pass the barrel several times until we wipe it well. The same is done for the outside. We check the trigger mechanism without dismantling it and remove dust and dirt. We check the wooden parts for possible cracks and wipe them with a slightly damp cloth if dirt or other materials are present. We assemble the firearm and place it in the locker which is inaccessible to children and irresponsible adults.

Annual maintenance

Once a year and usually after the end of the hunting season, we do a more thorough maintenance on our gun. Apart from all the above we do during a regular maintenance, once we have dismantled the gun, we take one by one all of its parts and rinse them by using a brush with clean gasoline or nitro solvent. This cleans and removes solidified lubricants and any other impurity. Particularly thorough washing needs the trigger mechanism as well as the recoil assembly in the case of repeating or semi-automatic shotguns which house them in the stock. We also wet the inside of the barrel with the special cleaning fluid and leave it as long as required (according to the manufacturer's instructions) so that the leadings or polyethylene residues "inflate". Subsequently we rub the inside of the barrel with the wire brush so that the residues come off. After wiping well all the parts of our weapon we lubricate it and after a while we wipe it again to remove the unnecessary lubricants. If the wooden parts have a flax-seed oil finish it is good to have a wax coating. The gun is assembled and placed in the locker. If during inspection there is something that draws our attention, we need to visit a gunsmith.

7. Secure storage

Firearms are always kept in our permanent residence and never in cottages, huts, cars, farms etc. Improper storage is a criminal offense and is being prosecuted. At home firearms should always be kept in a locked cabinet or weapons locker and in such a state so that they are not able to function. Ammunition is also kept in a locked cabinet, separately from the firearms. It is advisable not to store firearms in a case because they often contain moisture and unwanted oxidations might develop.

Under no circumstances are children allowed to play with firearms.

8. Secure use

10 Commandments of shooting safety

- 1. Treat each firearm like a loaded firearm.
- 2. Always control the muzzle of the firearm. Hold the gun firmly with the hands and secured until ready to shoot. Never touch the trigger with the finger until the moment we are preparing to shoot.

- 3. Be sure of your target and what is beyond. Be sure of recognizing huntable species. Otherwise one cannot be called a hunter.
- 4. Always check the barrel and the action so that they are free from foreign material and always use the proper ammunition.
- 5. When we do not use our firearm we always make sure that it is empty and open, if it is a break-action shotgun and with an open bolt assembly if it is a repeating or semi-automatic shotgun. The firearm is transported from and to the hunting ground empty and in a case.
- 6. Never point a firearm at anything you do not want to shoot. Avoid horseplay with a firearm.
- 7. Never climb a fence or jump a ditch with a loaded firearm. Never pull a firearm towards you by the muzzle.
- 8. Never shoot a bullet at a flat, hard surface or water. During target practice be sure your backstop is adequate.
- 9. Store firearms and ammunition separately beyond the reach of children and careless adults.
- 10. Avoid alcoholic beverages before or during hunting. As it is said "alcohol and gunpowder do not make good cocktails".

Accidents in hunting

Guns are machines that have been constructed in order to kill. Apart from very fine shots, all the other are able to penetrate human skin and can cause more or less serious injuries depending on the shooting distance. In cases of injury by slugs or chevrotines the injuries will be very serious or even fatal.

Fortunately however hunting accidents are not so many compared to accidents during other recreational activities. Accidents occurring at work or at home are much more than those occurring during hunting. According to statistical studies, the proportion of deaths from hunting accidents is very low, almost negligible, in relation to deaths from other accidents.

Hunting is a more secure activity compared to many others. As we are all involved in recreational hunting, we have to constantly ensure that these accidents are eliminated or reduced to a minimum.

Special attention should be paid in wild boar hunting because it is carried out in mountainous forested areas and the ammunition used is very powerful.

Major causes of accidents

- Violation of safe transport and storage rules (e.g. transfer of loaded weapons in cars).
- Wrong judgment of the hunter (e.g. misidentification of the target or its environment).

• Lack of skill or experience of the hunter (e.g. fall combined with unsafe grip of the gun etc.).

Prevention

Once the trigger is pulled nothing can stop the shot. Thus we should not let the accident happen. Therefore:

- We don ton hunt absent-minded
- · We keep safety distances
- We know well and instinctively apply the rules of safe handling of firearms
- We handle firearms with responsibility
- We do not shoot if the target has not been identified with absolute certainty
- We do not move unannounced when hunting in places or conditions of limited visibility
- In wild boar hunting we avoid camouflage-colored clothing and always prefer orange fluorescent vest or hat.
- We shoot so that the projectiles will end on the ground safely.

Carrying firearms safely

There are many ways of carrying a firearm on the hunting ground and each one has its own safety rules. A common rule is that the muzzle should point in the air or at the ground. The main carrying positions are:

Elbow Carry

- 1. Hook the forearm over your elbow. Point the muzzle at the ground.
- 2. This has the least muzzle control. You can use it when no one is in front of you.
- 3. It fits in the case of break-action shotguns when they are "open".

Cradle Carry

- 1. Cradle the barrel in the bend of one arm. Hold the small of the stock with the other hand. Hold the small of the stock with the other hand.
- 2. This carry gives the hunter reduced readiness.

Trail carry

- 1. Grip the stock with one hand.
- 2. Cannot be used when being behind another person.

· Double-hand

- 1. Grasp the firearm's grip in one hand. Hold the forearm in the other hand.
- 2. This carry gives best control.

Shoulder Carry

- 1. Hold the grip. Lean the firearm on your shoulder. The muzzle should point up.
- 2. This carry works well in waist-high brush. It cannot be used if someone walks behind.

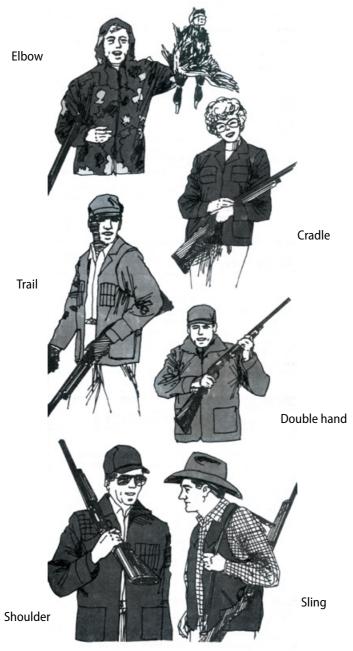


Fig. 8.1 - Carrying firearms safely

Sling Carry

- 1. Hang the firearm from one shoulder by a sling. Point the muzzle in the air. Grip the sling at your shoulder with the hand on the carrying side.
- 2. Take the firearm from your shoulder when crossing obstacles.
- 3. This carry is comfortable for long hunts in open country.

Basic instructions for safe handling of a firearm

Using a safety

Reach for the safety until you find it from habit and learn to tell the on and off position by your touch.

Safe loading

- 1. Control the muzzle. Point it in a safe direction. Know the location of all people in your area.
- 2. Open the action. Check it for proper operation. Leave it open. Check if the barrel is clear.
- 3. Put in the cartridges. If we have a repeating or semi-automatic shotgun count the cartridges that are put in the magazine.
- 4. Close the action. The chamber is loaded.
- 5. Put the safety on.
- 6. Carry the firearm safely.

Safe unloading

- 1. Keep your finger outside the trigger guard.
- 2. Control the muzzle. Point it in a safe direction. Know the location of all people in your area.
- 3. Open the action.
- 4. Remove the magazine. Eject cartridges if it is the only way to remove them.
- 5. Check if all the cartridges are out and the magazine is empty.
- 6. Don not let the action completely close.

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- The Hunting Federation of Macedonia Thrace
- The Hunting Association of K. Neurokopi "ARTEMIS"
- The municipality of K. Neurokopi
- The Association "EURORADAR" of Bulgaria
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