



# Hunting With Non-Toxic Ammunition



SAM FORLENZA  
SENIOR BIOLOGIST  
NJ HUNTER EDUCATION PROGRAM  
BUREAU OF INFORMATION & EDUCATION



# Non-Toxic Ammunition



- What is it?
- How long has it been around?
- Why use it?
- Concerns of use?



# What is Non-Toxic Ammunition?

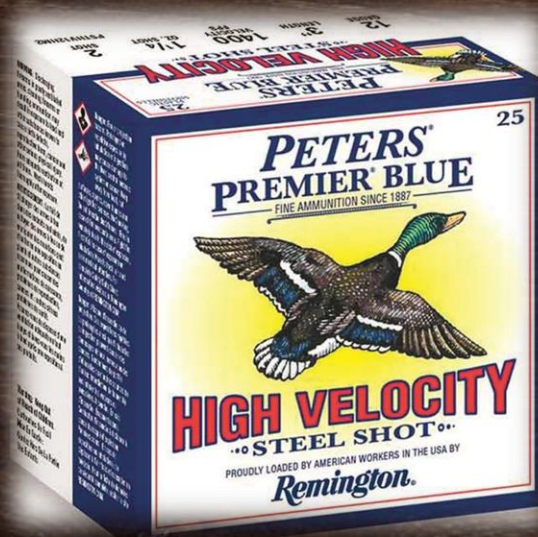
- USFWS definition: “Any type of shot that does not cause sickness or death when ingested by migratory birds.”
- Non-toxic options have been around for over 50 years.
- Non-toxic ammunition includes:
  - Tungsten
  - Bismuth
  - Copper (slugs)
  - Steel
  - Various alloys of the above metals





# History of Non-Toxic Ammunition

- 1976 – non-toxic shot “zones” established on national level for waterfowl hunting.
- 1990 – required statewide for waterfowl in NJ.
- 1991 – required nationwide for waterfowl.
- 2019 – required for all hunting in CA.
  - Largely a result of studies done on California Condors.





# Why Use Non-Toxic Ammunition?

- Required for waterfowl!
- Potential for improved performance.
  - Advancements in technology
  - Denser metals.
- Reduces potential for lead exposure to wildlife.
  - Reduced fragmentation (solid projectiles)
  - No concern for accidental ingestion (shot pellets)
- Reduces potential for lead exposure to the consumer of the game meat.
  - Removed possibility of accidental human ingestion of lead fragments





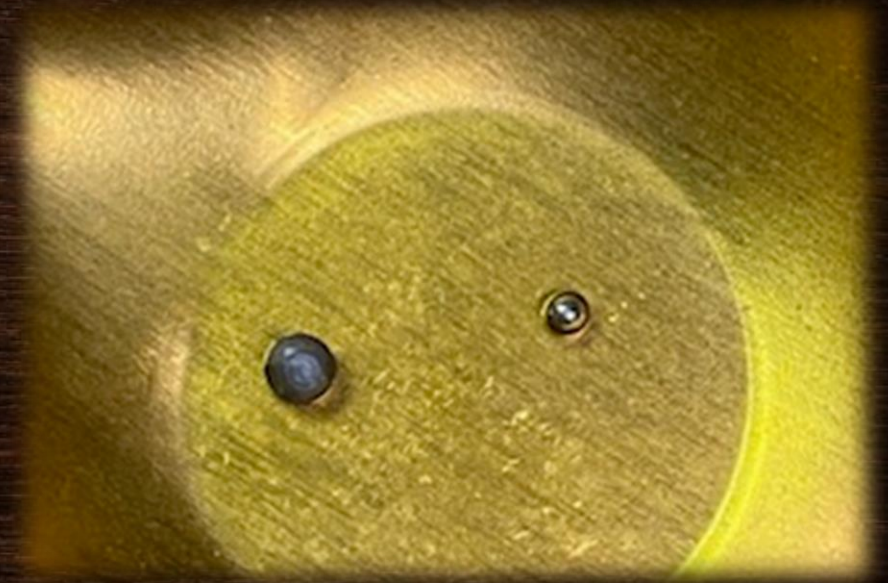
# Weighing the Options (literally)

- Lead shot: 11g/cc

- Steel: 7.8 g/cc

- Bismuth: 9.6 g/cc

- Tungsten Super Shot: 18g/cc





# Why Is Pellet Density Important?

Denser shot options allow for smaller shot size with same downrange energy.

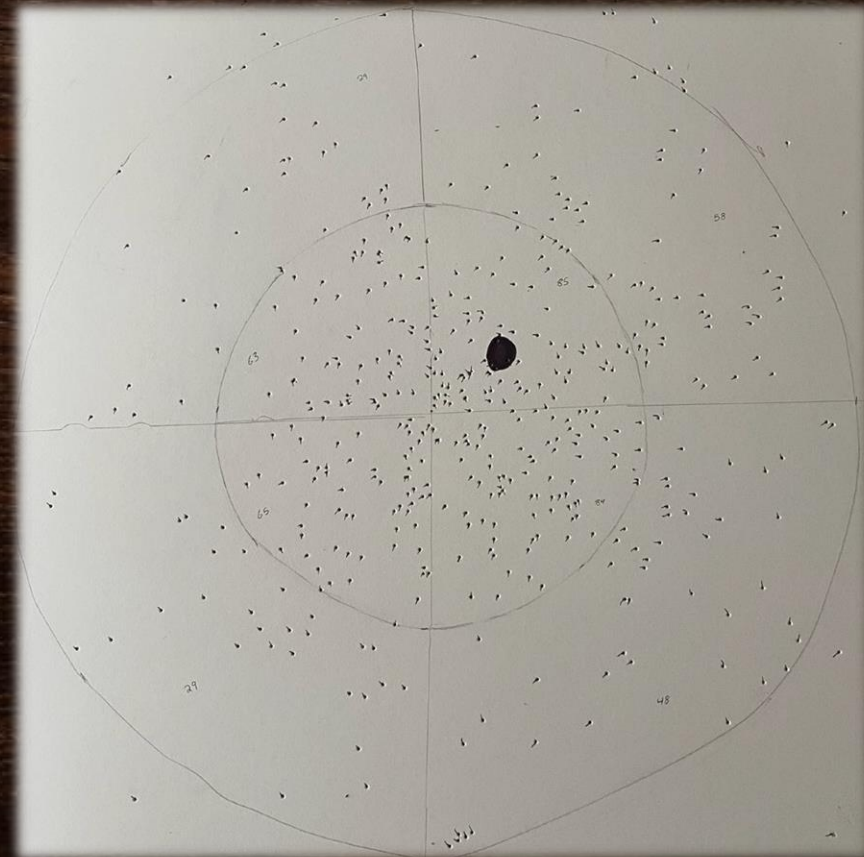


Smaller shot size allows for more pellets per shell.



More and smaller pellets achieve better pattern and penetration with less resistance allowing for quicker/cleaner harvests.

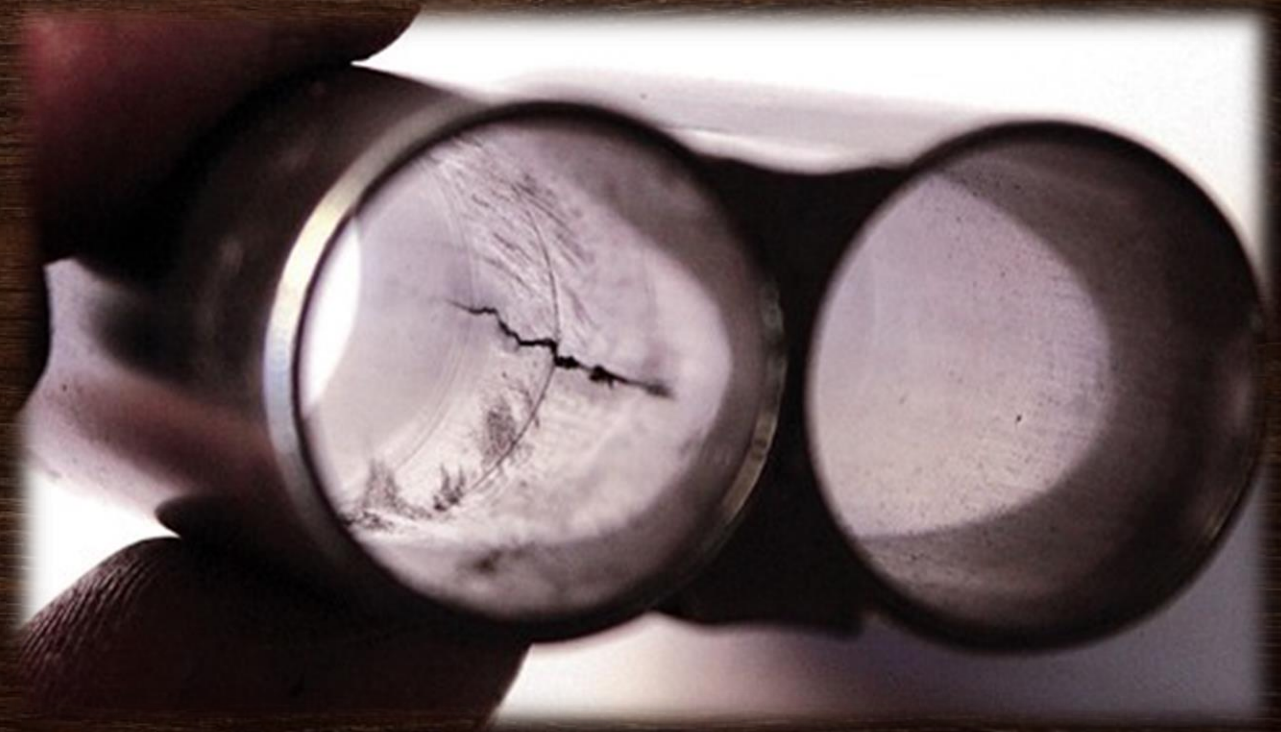
- Comparing 12 gauge 3" Turkey loads:
  - Lead #4: 237 pellets
  - TSS #7.5: 495 pellets





# Concerns With Non-Toxic Options

- Potential for barrel damage.
  - Older shotguns
  - Fixed full chokes
- Quicker loss of velocity with steel shot.
  - Not true of other non-lead alternatives.
- Cost
  - Bismuth and Tungsten carry a significantly higher price tag.





# Concerns – Older Firearms & Barrel Damage

- Older shotgun barrels were not designed to withstand the hardness of steel shot.
- General rule of thumb – no steel shot unless the owner's manual specifies that the firearm is “steel approved.”





# Concerns - Tight Choke Constrictions

- Some firearms may have fixed full choke barrels or screw-in full chokes.
- It is generally advised not to shoot steel through anything tighter than a modified choke.
- Steel does not behave like lead! It can't compress as it passes through a tight choke.
- Other non-toxic options are softer and can be used in these firearms.





# Concerns - Trap and Skeet Shooting Clubs

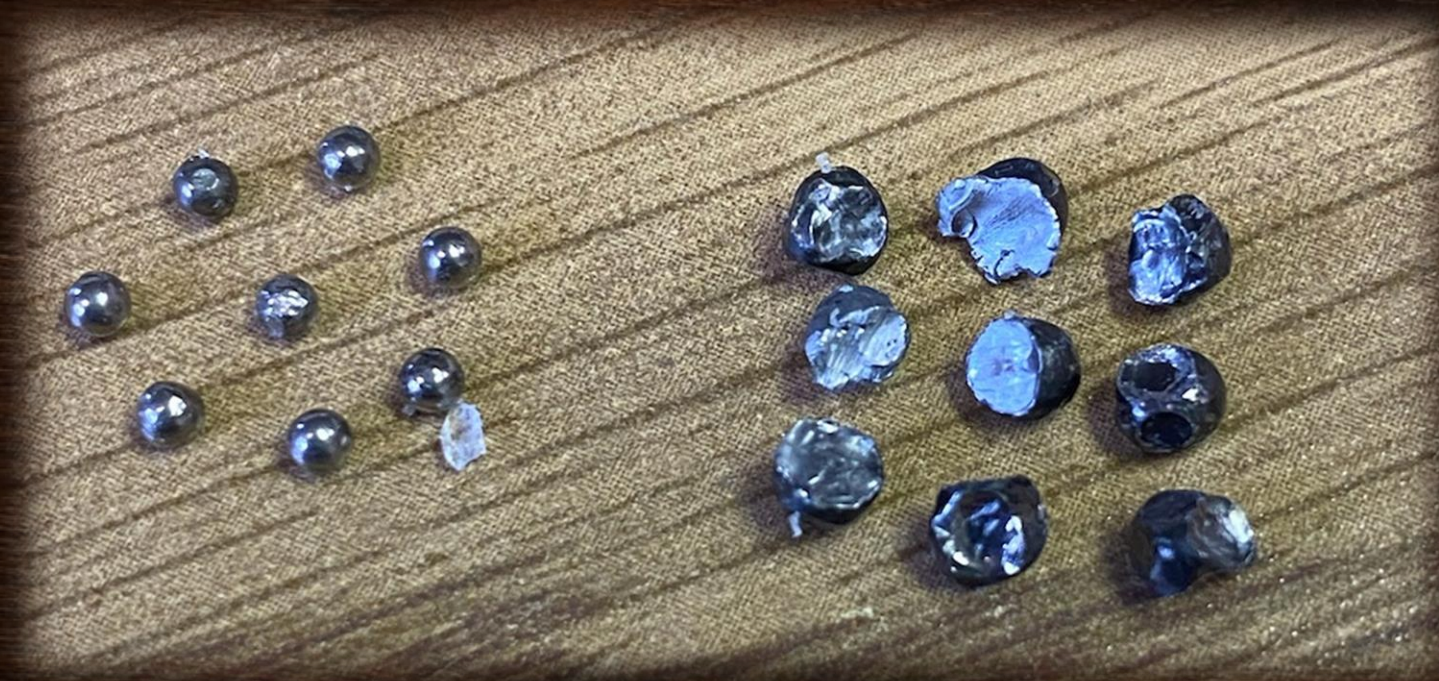
- Check with your local trap and skeet ranges before bringing non-toxic shotshells.
- Many ranges contract companies to mine out the lead shot periodically.
- Steel and other non-toxic shot is often not allowed to be used as it would complicate the lead shot mining process.





# Possible Concerns with Lead

- Lead is soft
  - Pellets can compress and deform while leaving the barrel and may cause poor patterns.
  - Fragmentation is more likely to occur with lead slugs than copper.





# Advancements in Non-Toxic Shotshell Technology

- Problem: Steel shot traditionally didn't deliver the downrange energy that lead did.
  - Very limited effective range
  - Poor penetration
- Solution: Improving all components of shotshell technology
  - Pellet shape
  - Wad design
  - Advanced slow burning powders (increased velocities)
  - Buffering shot





# Advancements - Pellet Shape

- Banded Pellets
  - Semi-sharpened belt around midsection.
  - Designed to cut through feathers for better penetration.
- Hex Pellets
  - Stack better in wad to create space for more pellets.
  - Flat sides help pattern spread open more consistently.
  - Multiple edges cut through feathers for better penetration.





# Advancements – Wad Design

- “Flite Control Wad”
  - Designed to remain with the shot after exiting the barrel unlike traditional wads.
  - Petals expand from the rear as opposed to traditional front opening wad petals.
  - Designed to control pattern density downrange.





# Advancements – Powder Technology

- Early versions of non-toxic shot used same components as standard lead loads with the substitution of steel pellets – extremely ineffective.
- Steel shot requires higher velocities than lead to deliver the same results.
  - Companies can't just put more powder in, as chamber pressure will reach unsafe levels.
- Solution: Advanced powders with a slower burn rate achieve optimal velocities while maintaining low chamber pressure.





# Advancements – Buffering Shot

- Buffering shot consists of adding a flaky wax material to the shot inside the wad cup to fill the gaps.
- Because of its hardness, as steel shot travels down the barrel, pellets want to bounce off each other.
- Adding buffer provides a soft layer between pellets to keep patterns tighter.
- Buffering has become popular with buckshot loads as well.





# Why Consider Copper Slugs?

- Allow for better bullet expansion
  - Improved wound channel.
- Reduced bullet fragmentation
  - Bullet retains and delivers more of its initial weight and energy to the target.





# Comparing Costs

- Cost increases due to the pandemic still have prices skewed.
- Shotshell Prices:
  - Lead: \$\$
  - Steel: \$\$\$
  - Bismuth: \$\$\$\$\$
  - Tungsten: \$\$\$\$\$\$\$\$\$\$
- Slug Prices:
  - Lead: \$\$\$
  - Copper: \$\$\$





# Takeaways

- Both lead and non-toxic ammunition can be highly effective when used in the correct situation.
- Certain non-toxic alternatives can provide increased effectiveness but may come at a higher cost than lead.
- If lead fragmentation is a concern, various other shot types can provide safe and effective options.





# Thank You!



# Questions ?