15 Years Experience with Alternative Bullets: Performance Differences

Ryan Bronson, Director of Conservation and Public Policy
Bringing the World Outside

Our Mission

To bring the world outside, leverage our capabilities and experience and instill passion into products that help outdoor enthusiasts achieve independence and success in the activity of their choice.
**Integrated Portfolio of Leading Brands**

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**Providing Our Customers a Single Source for Top Outdoor Brands and Products**

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Key Themes

• Non-lead alternative bullets for big game: Copper-alloy monolithic
  • Expand less
  • Penetrate more
  • Lower density
  • Longer
• Bullet lethality is a function of energy transfer
  • Expansion
  • Penetration
  • Kinetic Energy converted to shock and trauma
Federal Premium Ammunition’s Expertise

- 2000- Began loading the Barnes® coated X bullet in rifle cartridges
- 2004- Replaced with Barnes® Triple Shock X in rifle cartridges
- 2004- Barnes® Expander added in shotshell slugs
- 2006- Barnes® Expander added pistol
- 2007- Barnes® MRX bullet added
- 2008- Barnes® tipped TSX bullet added in rifle
- 2008- Speer® TNT® Green™ varmint bullet added
- 2012- Federal Trophy® Copper added for rifle and shotshell
- 2014- Federal Trophy® Copper MZ added for muzzle loaders
Terminal Performance

- What the bullet does once it hits and passes through a target.
- How animal is killed by a bullet.
  - Instantaneous: Massive trauma causes changes in blood pressure that cause critical brain functions to stop immediately or other organs to fail
  - Delayed: Blood loss from wound trauma causes more gradual decrease in blood pressure and system shut down
  - Catastrophic organ shut down. Heart, spinal, brain
Expansion

- Lead Pb bullets “mushroom”
  - Softness of metal
  - Thickness of jacket
  - Bonded or not
  - Partition or shank limit
  - Velocity

- Copper alloy bullets petals peel back
  - Wall thickness
  - Hollow cavity size
  - Velocity must be supersonic for reliable expansion

- Frontal diameter upon expansion
Trauma

- Bullet path
- Temporary wound channel
  - Cavitation caused by hydrostatic shock
Extreme: Varmint bullet (TNT Green)
Other Extreme: Solid Non-Expanding Bullet
Comparing 165 grain 30-06 Sprg (7.62 X 63mm) Bullets: Lead and Non Lead

- Energy similar
- All fired from 100 yards from same rifle

Comparing
- Penetration
- Temporary wound channel
- Weight retention
- Expansion
Fusion® - Lead core electroplated to jacket
Trophy® Copper- Monolithic copper alloy
Trophy Bonded® Tip- lead core bonded to jacket, solid shank, skived nose
Graphic Depiction of Temporary Wound Channels

- Varmint
- Solid
- Fusion®
- Trophy Bonded® Tip
- Trophy® Copper
Hunter/regulator considerations for copper bullets

• Rate of twist of barrel may prefer lighter Cu bullet
  • Longer bullets need more twist to stabilize
• Shot placement/ energy transfer
  • Thicker, denser tissue will transfer energy better
  • Shoulder shots may increase lethality but damage more meat
  • Traditional behind shoulder shot placement may result in longer recovery time
• Increased pass through, what is beyond the target
• Velocity, suppressors
• Cu bullets cost more
  • Material Cu cost 4+ X Pb
  • Energy inputs for Cu higher (harder, higher melting point)
  • Recycled lead is most common source (in the US)
THANK YOU