



**ANTIDOPING  
SVERIGE**

18 June 2024

# History of Anti-Doping Rule Violations by SARMs in Sports

Jenny Schulze

## Substances prohibited in Sports- The International Standard for the Prohibited List



The World Anti-Doping Code

# THE 2008 PROHIBITED LIST INTERNATIONAL STANDARD

The official text of the *Prohibited List* shall be maintained by **WADA** and shall be published in English and French. In the event of any conflict between the English and French versions, the English version shall prevail.

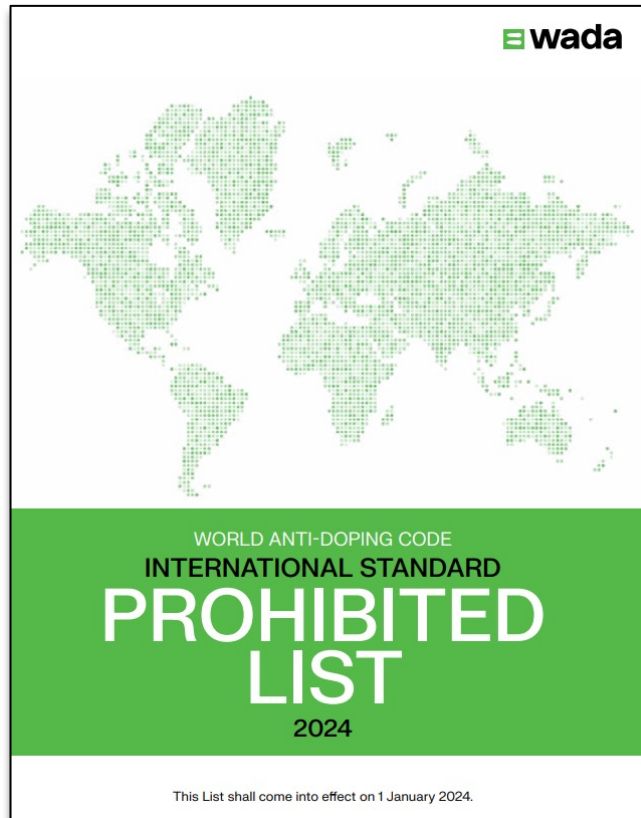
This List shall come into effect on 1 January 2008

## Section S1.2 "Other Anabolic Agents"

### 2. Other Anabolic Agents, including but not limited to:

Clenbuterol, selective androgen receptor modulators (SARMs), tibolone, zeranol, zilpaterol.

## Prohibited List 2024

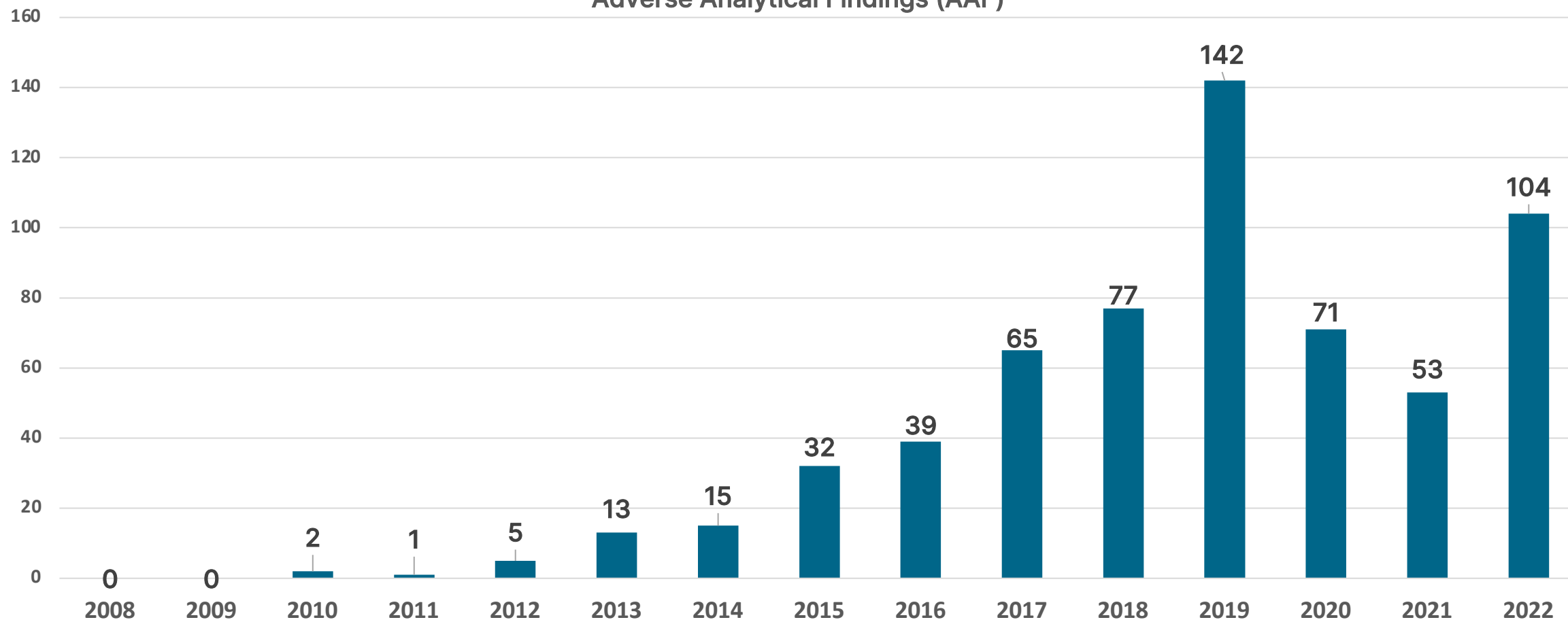


### S1.2. OTHER ANABOLIC AGENTS

Including, but not limited to:

Clenbuterol, osilodrostat, ractopamine, selective androgen receptor modulators [SARMs, e.g. andarine, enobosarm (ostarine), LGD-4033 (ligandrol), RAD140, S-23 and YK-11], zeranol and zilpaterol.

### Adverse Analytical Findings (AAF)



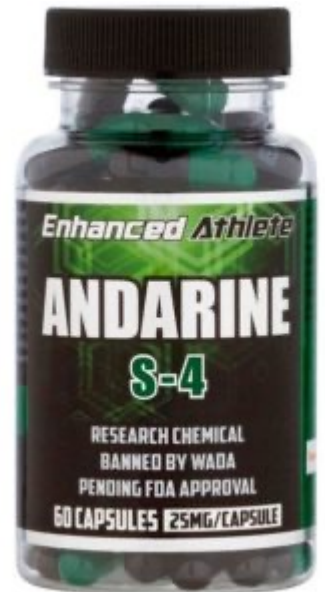
## First two positive cases of SARMs in sports in 2010

- Both for Andarine (S-4)
- 1) Female track and field Olympic athlete (400 m) from Jamaica (tested Out of Competition)
- 2) Male Minor League Baseball player tested in competition

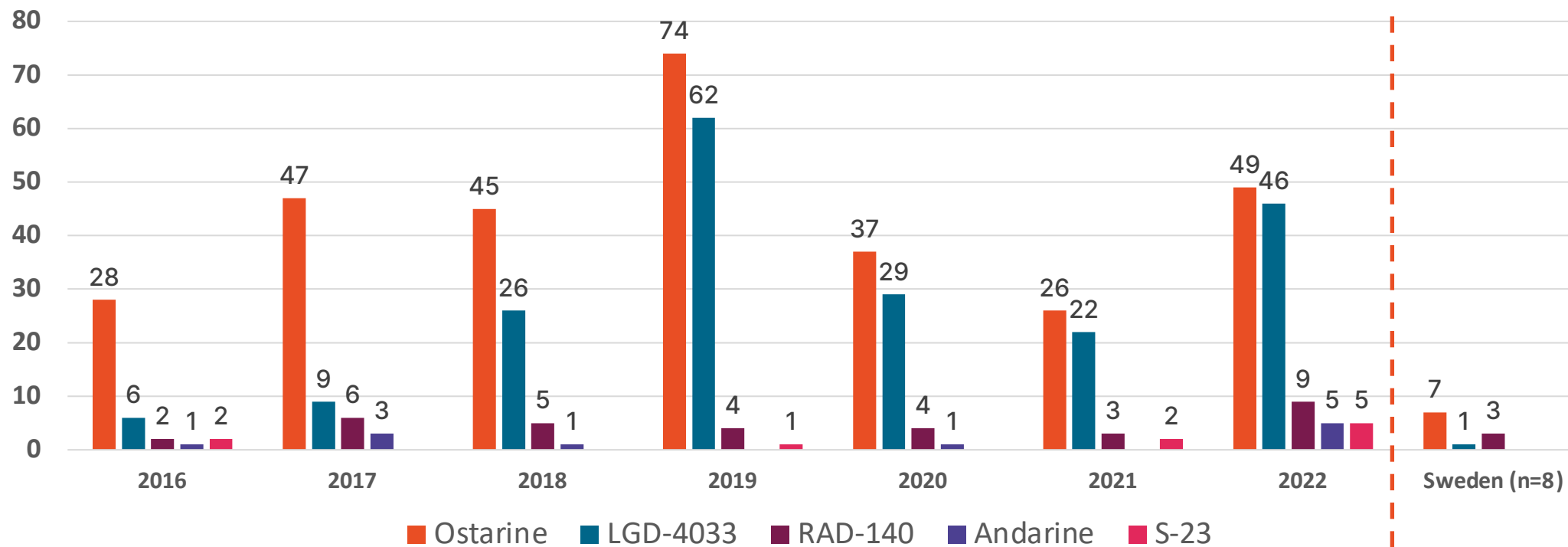


## What SARMS are athletes using?

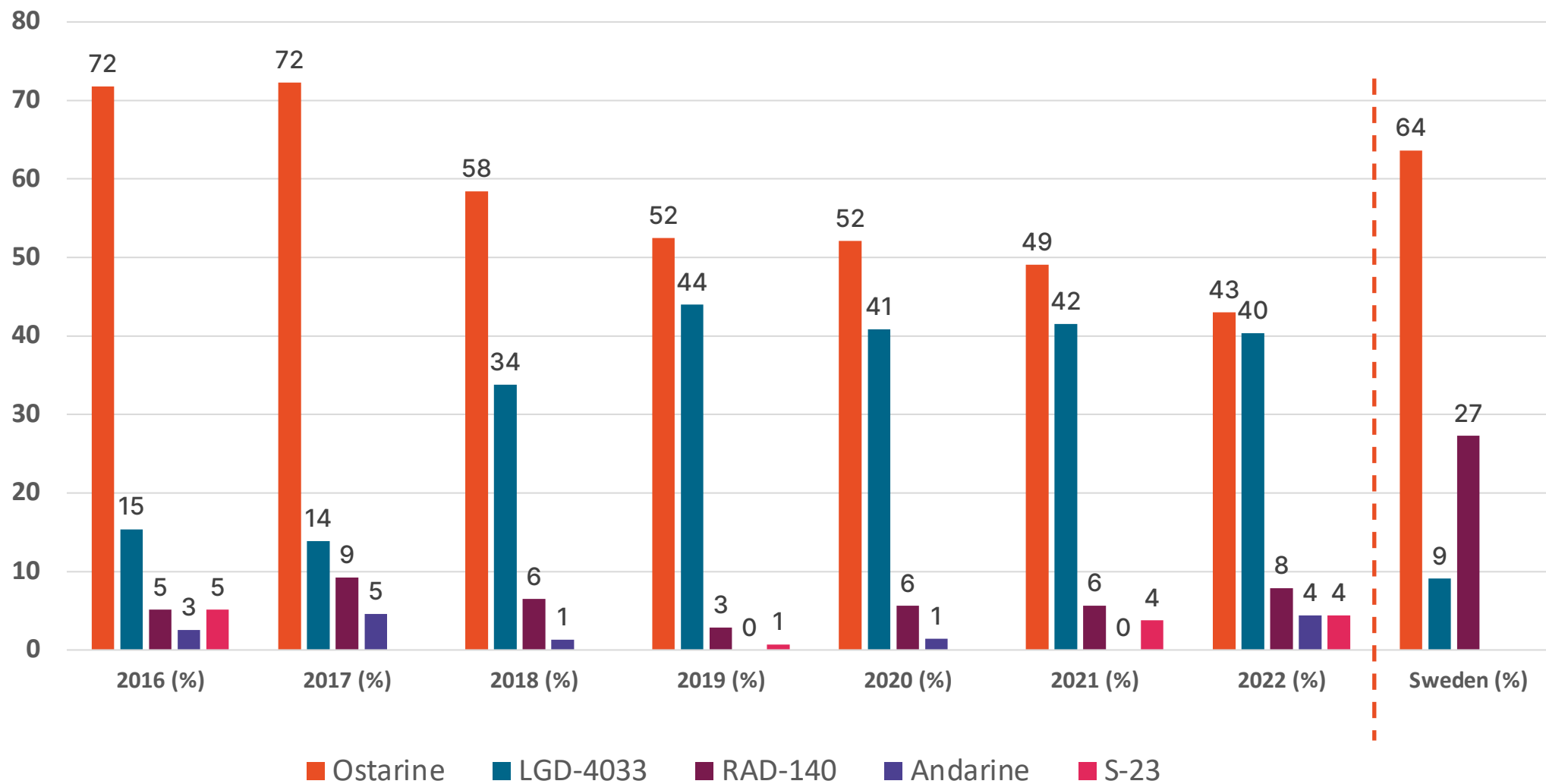
- Up until 2015 it was not specified
- Enobosarm, Ostarine, MK-2866
- LGD-4033, Ligandrol
- RAD140, Testolone
- Andarine (S4)
- S-23



## Number of Adverse Analytical Finding per SARM per year



## Percentage of the different SARMs detected





## Detection times in doping tests

- Ostarine: Single **1 µg** dose - 9 days
- LGD-4033: single **10 mg** dose - 21 days
- RAD-140: single **1 µg** - 9 days
- S-23: single **8 mg** dose - 28 days



## Who tests positive for SARMs?

→ 1/3 Female athletes and 2/3 Male athletes

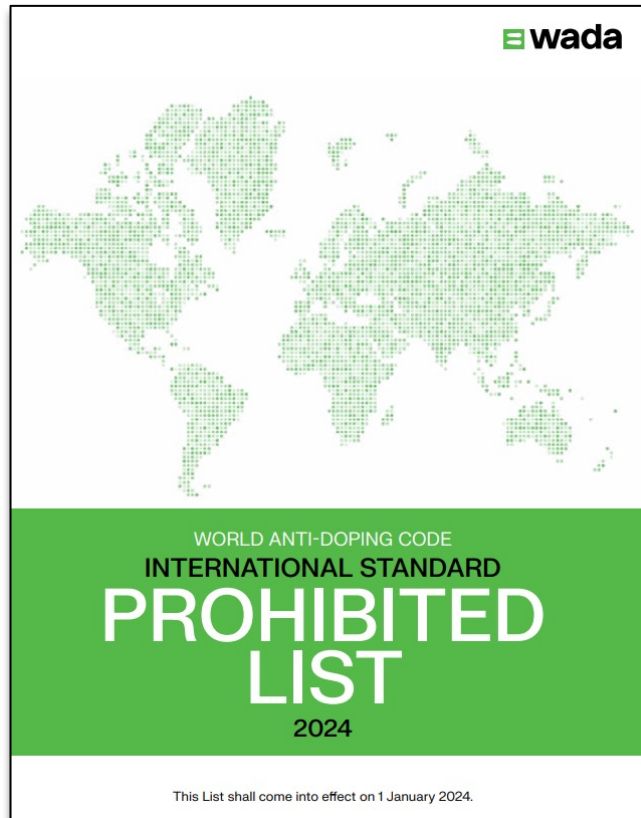
→ Top three sports (about 50 % of the cases):

- Track and Field
- Weightlifting
- Cycling
  
- Powerlifting, MMA, American Football, Triathlon...

→ Top three countries (about 50 %) are from

- USA
- Russia
- Canada

## GW1516 – added 2009



### S4.4. METABOLIC MODULATORS

S4.4.1 Activators of the AMP-activated protein kinase (AMPK), e.g. AICAR, peroxisome proliferator-activated receptor delta (PPAR $\delta$ ) agonists, e.g. 2-(2-methyl-4-((4-methyl-2-(4-(trifluoromethyl)phenyl)thiazol-5-yl)methylthio)phenoxy) acetic acid (GW1516, GW501516) and Rev-erba agonists, e.g. SR9009, SR9011

## GW1516 Adverse Analytical Findings in sports per year

