

2022 FLYSTRIKE RD&E TECHNICAL FORUM

Modelling of blowfly chemical
resistance

Dr Brian Horton – University of Tasmania

10 August 2022



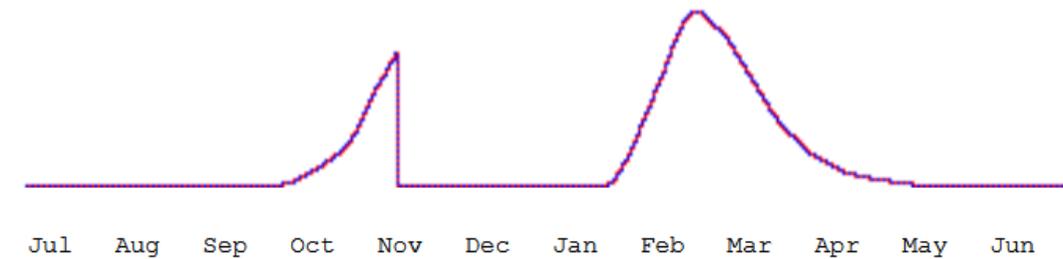
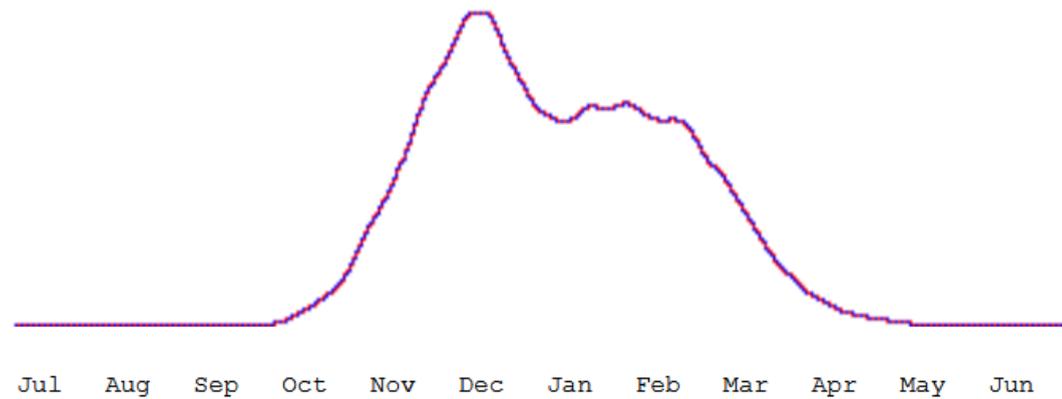
Modelling of Blowfly Chemical Resistance

Management to Delay Resistance

Brian Horton and Pia Benedetti Vallenari

Tasmanian Institute of Agriculture
University of Tasmania

The FlyBoss Tool optimises management without considering resistance

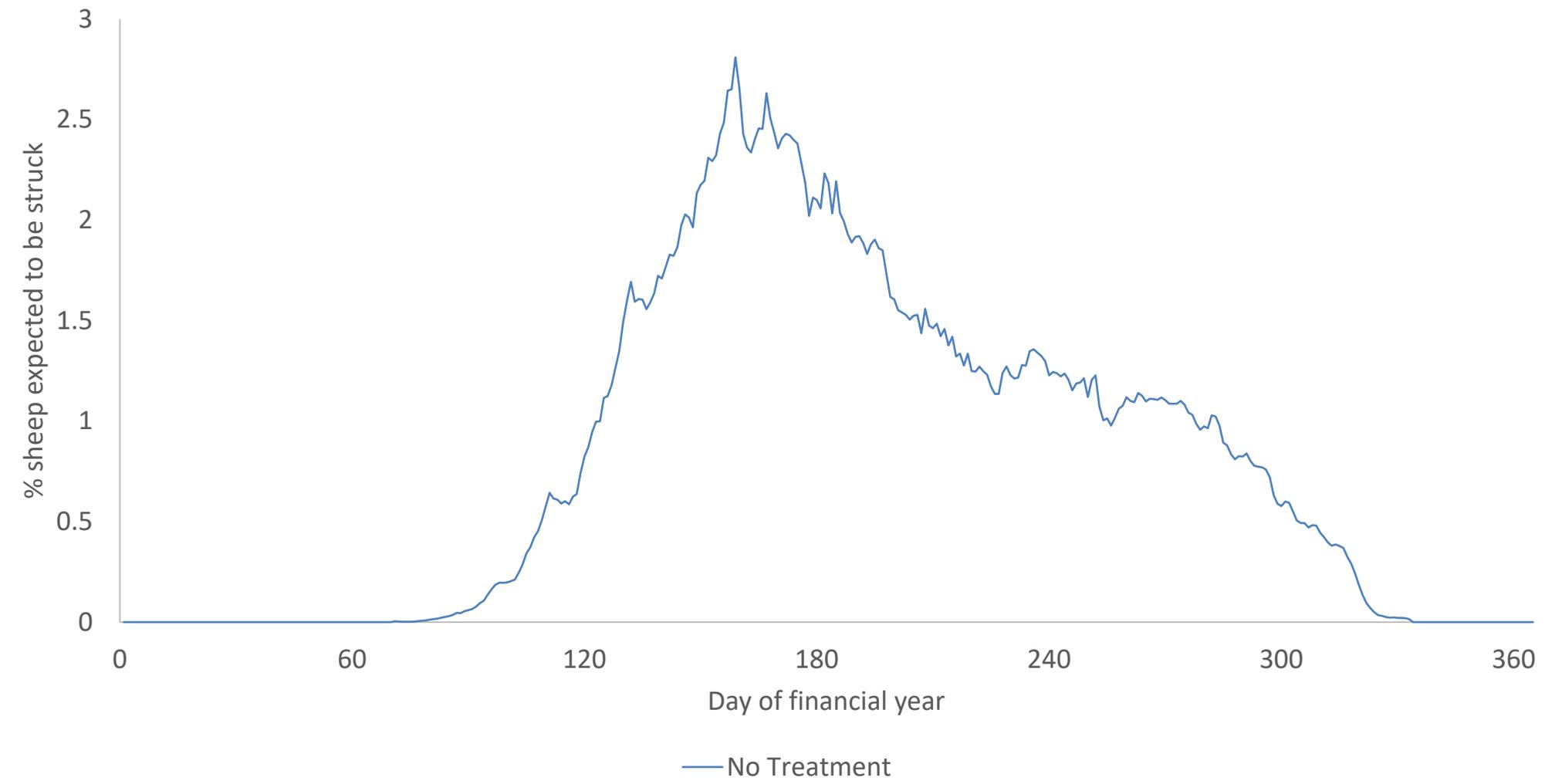


It always shows the best time of treatment assuming normal protection periods.
So it would recommend the same treatment at the same time every year for all sheep.

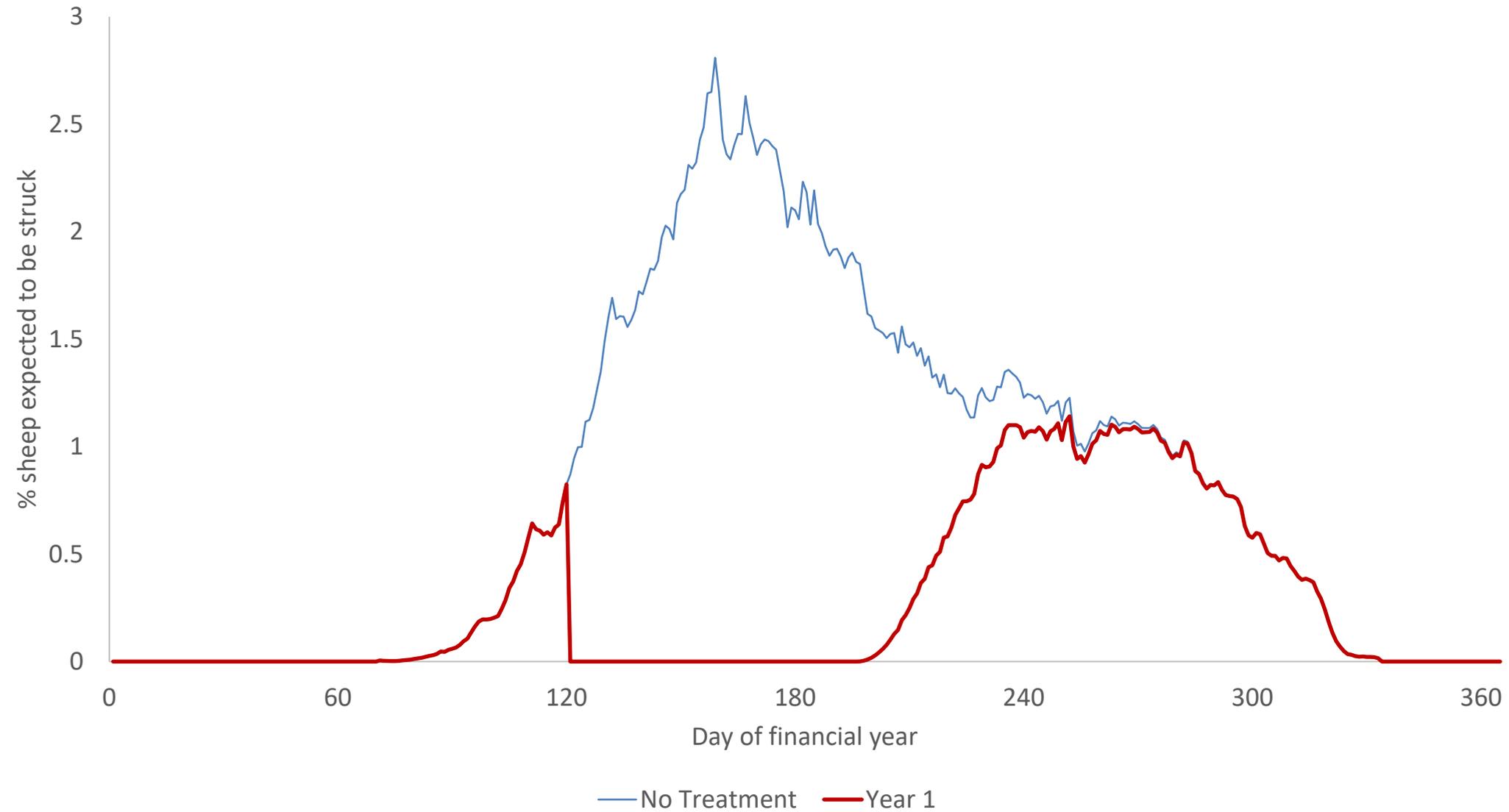
The Research Version was modified to allow for resistance

Ewes at Gunning

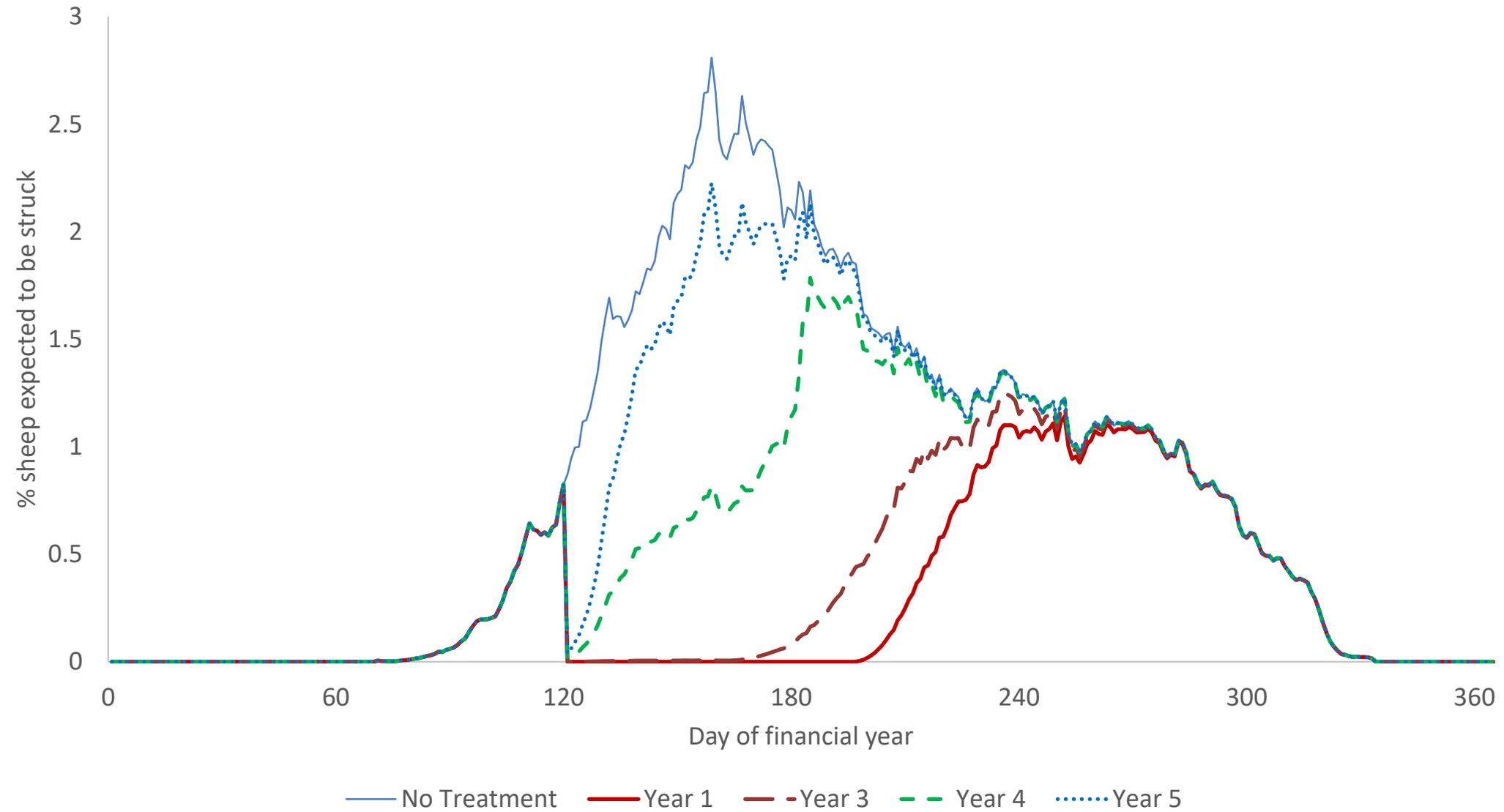
Expected % struck each week if no preventive treatment



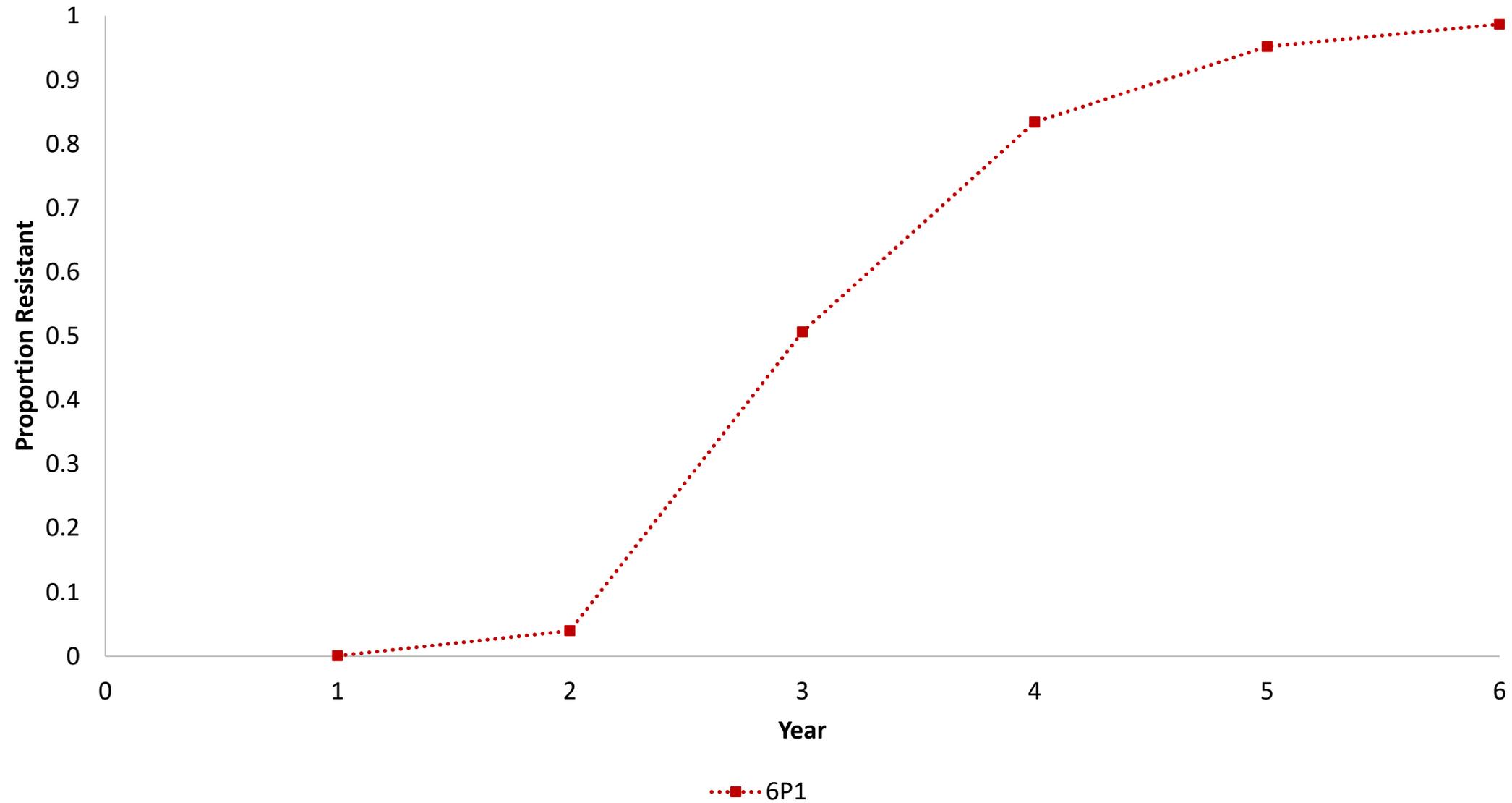
Optimum treatment once only per year – 29 October



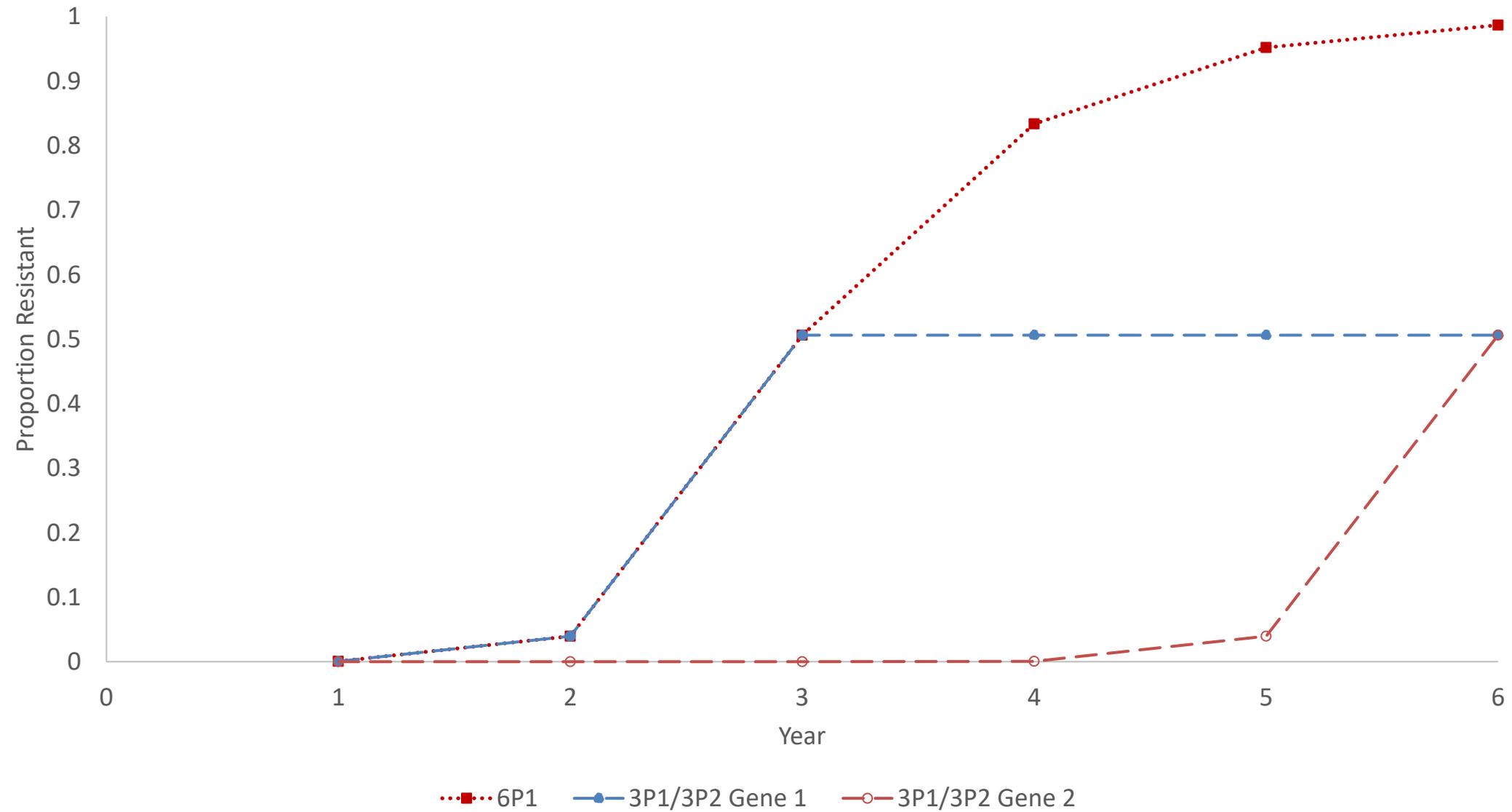
Same treatment on all sheep every year



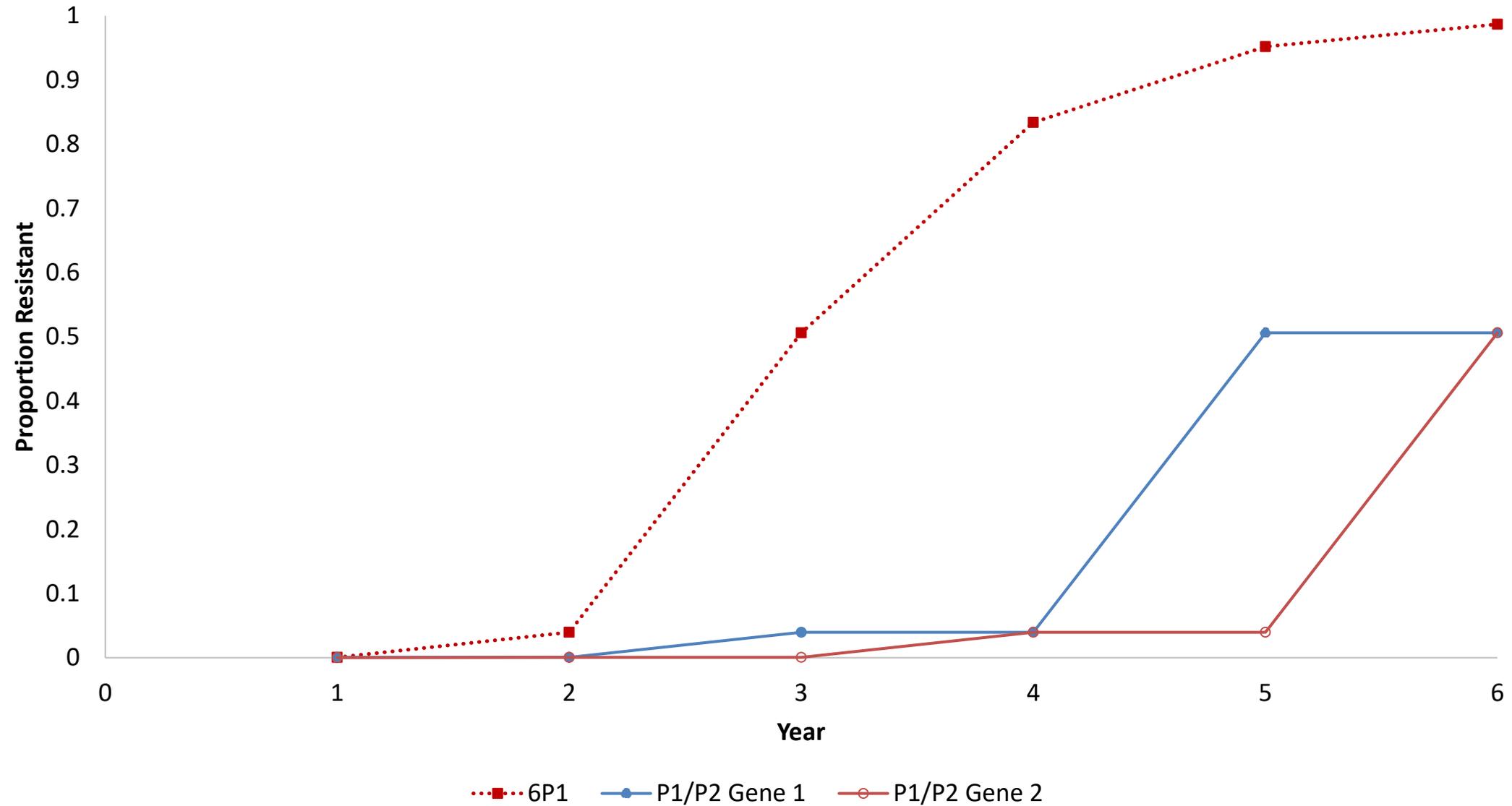
Gene Frequency - Same treatment on all sheep every year for 6 years



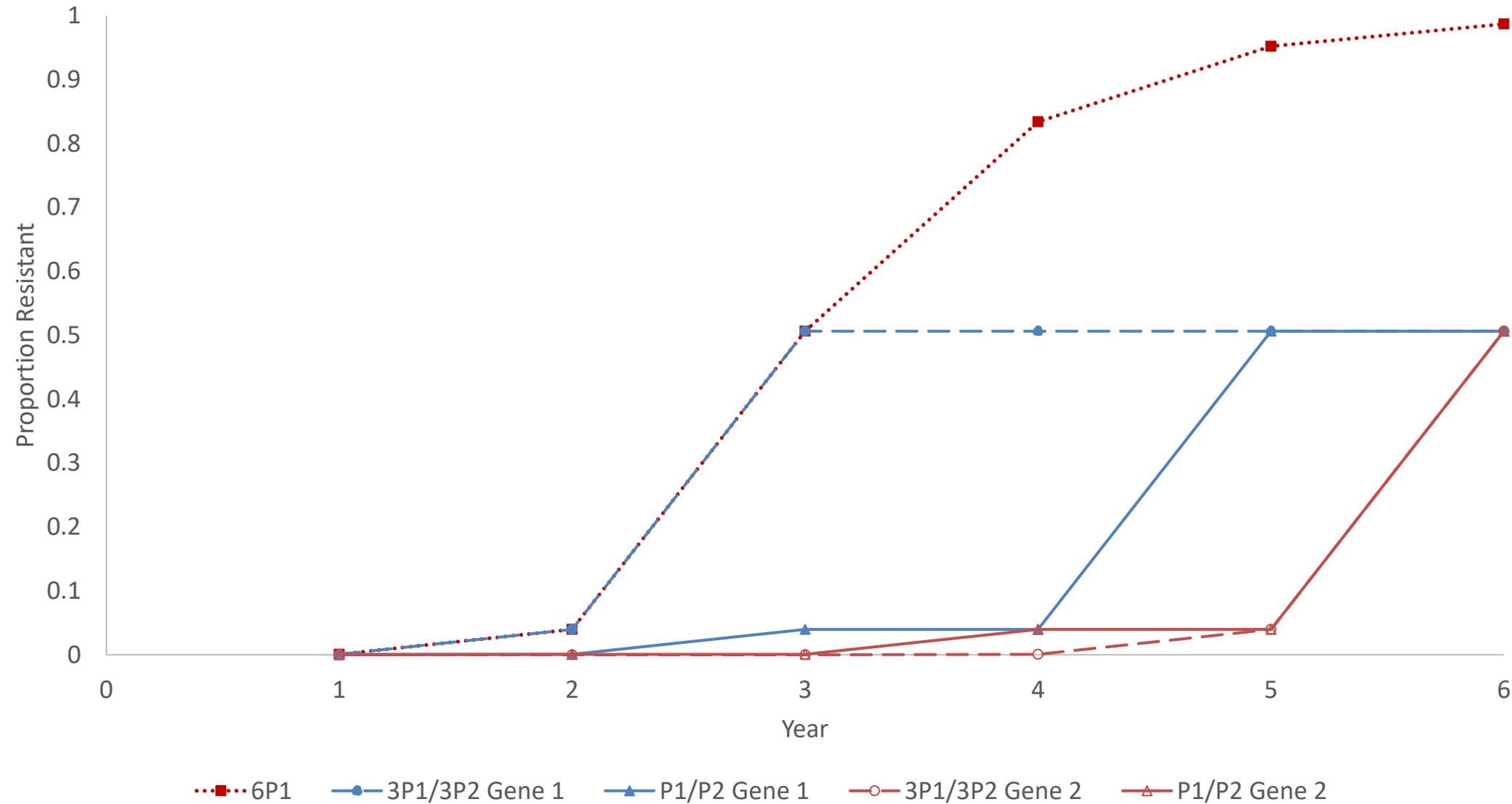
Product 1 for three years, then Product 2 for three years



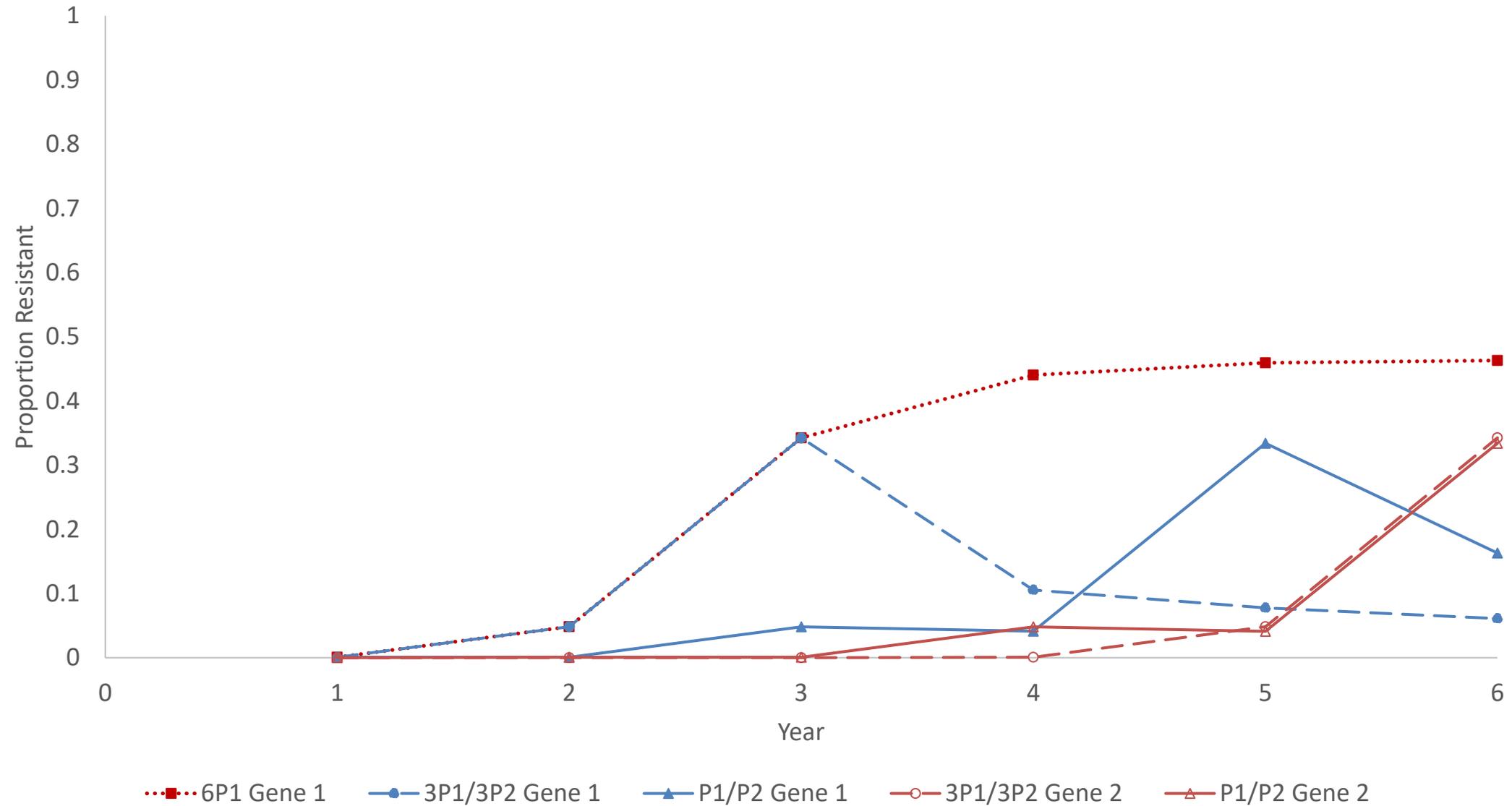
Rotation of Product 1 then Product 2 each year



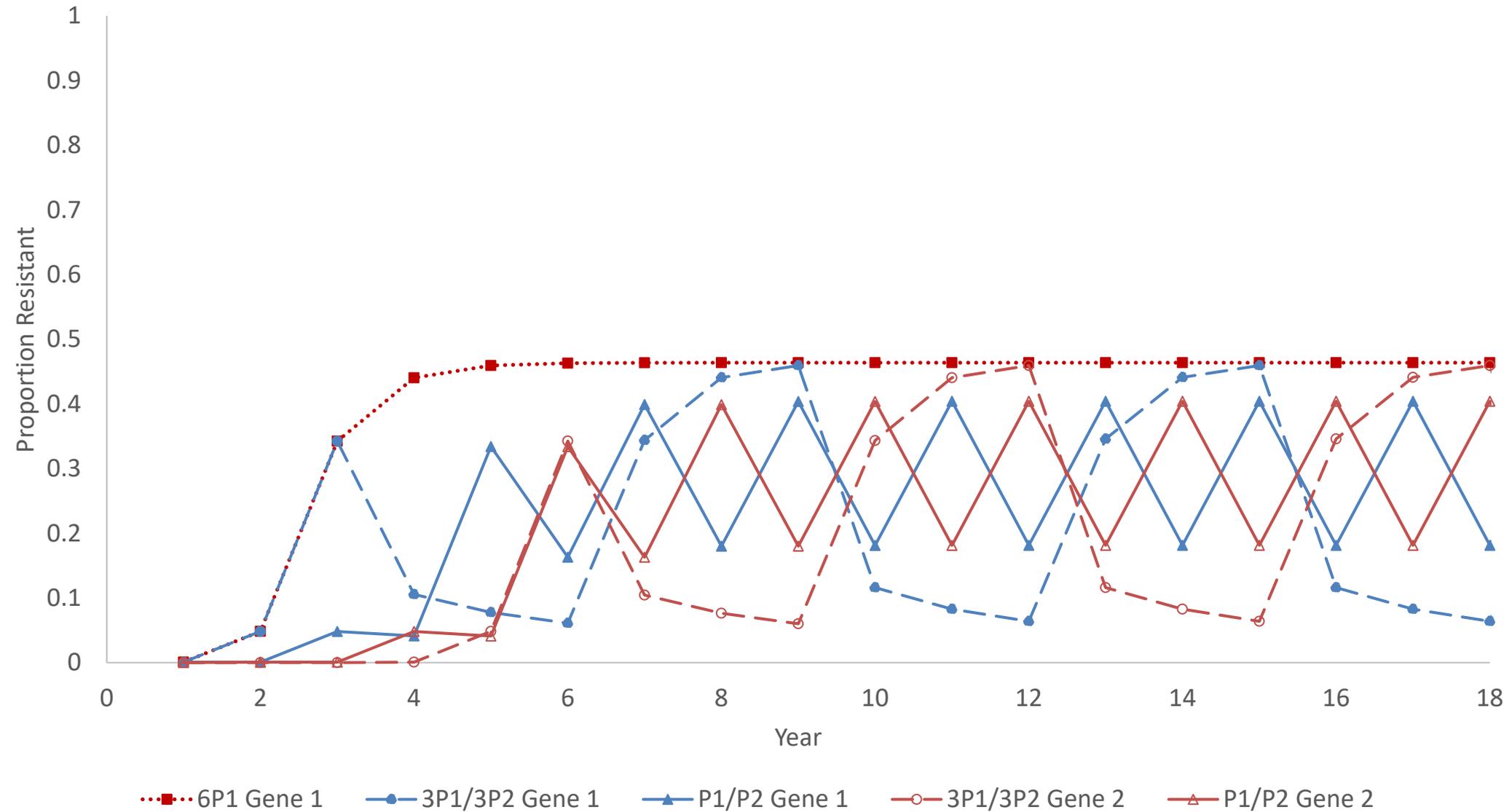
Annual Rotation vs 3-year Rotation



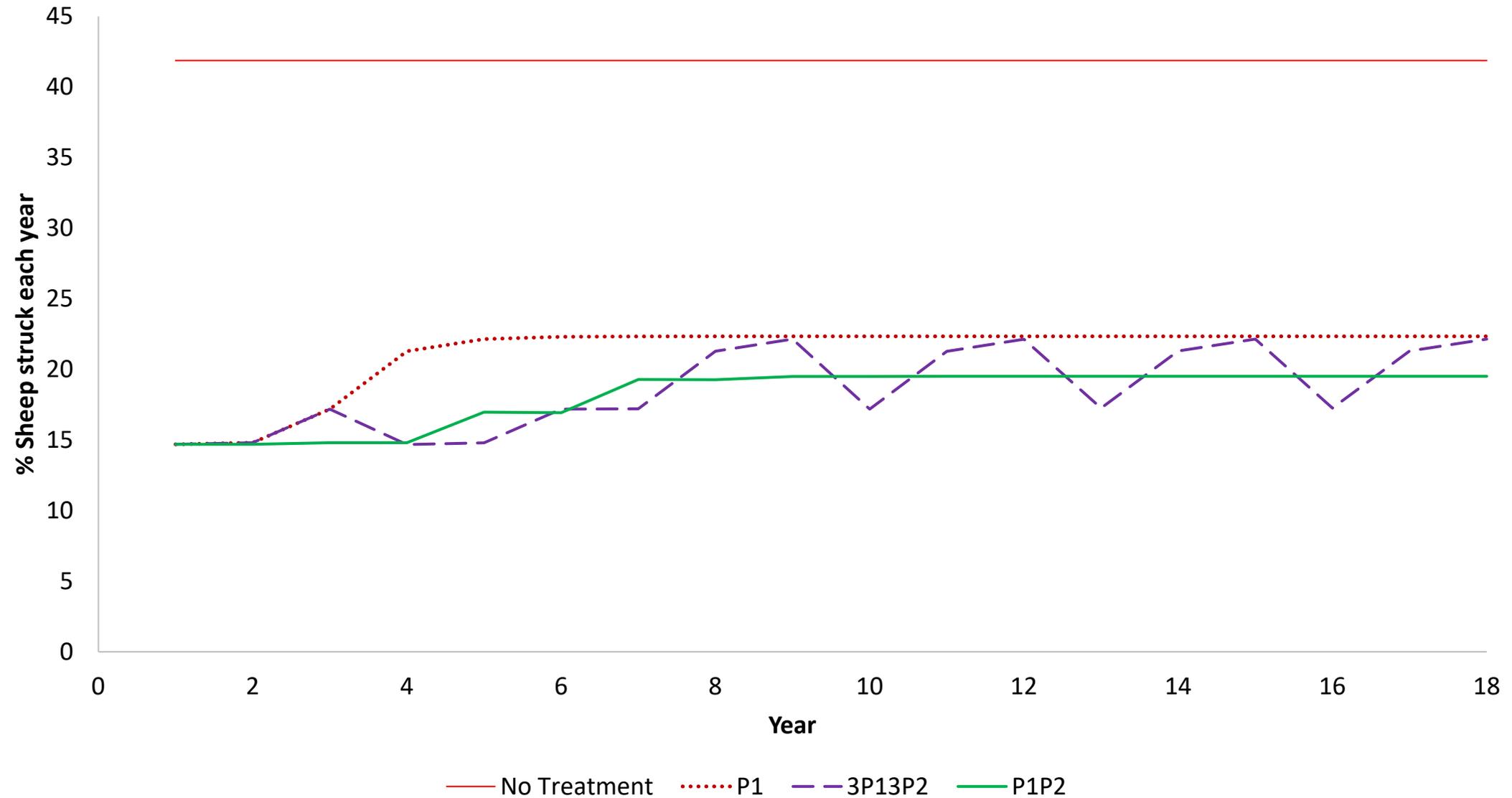
Annual Rotation vs 3-year Rotation with 50% Fitness Disadvantage



Annual or 3 yr Rotations over 18 years with 50% Fitness Disadvantage



Expected Strike with 50% Fitness Disadvantage



Rotations

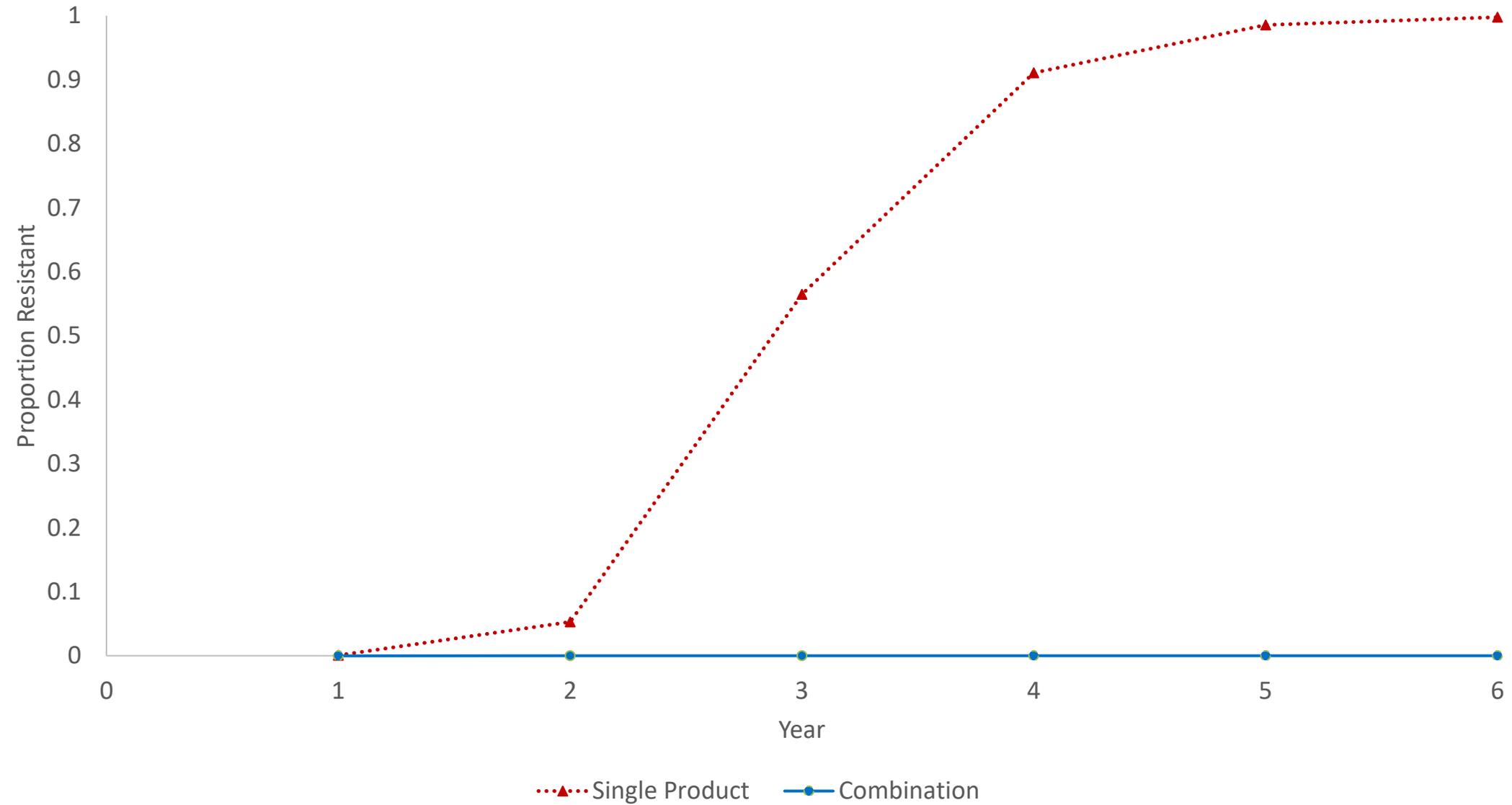
Rotation of different product groups is never a bad strategy.

But resistance will still increase.

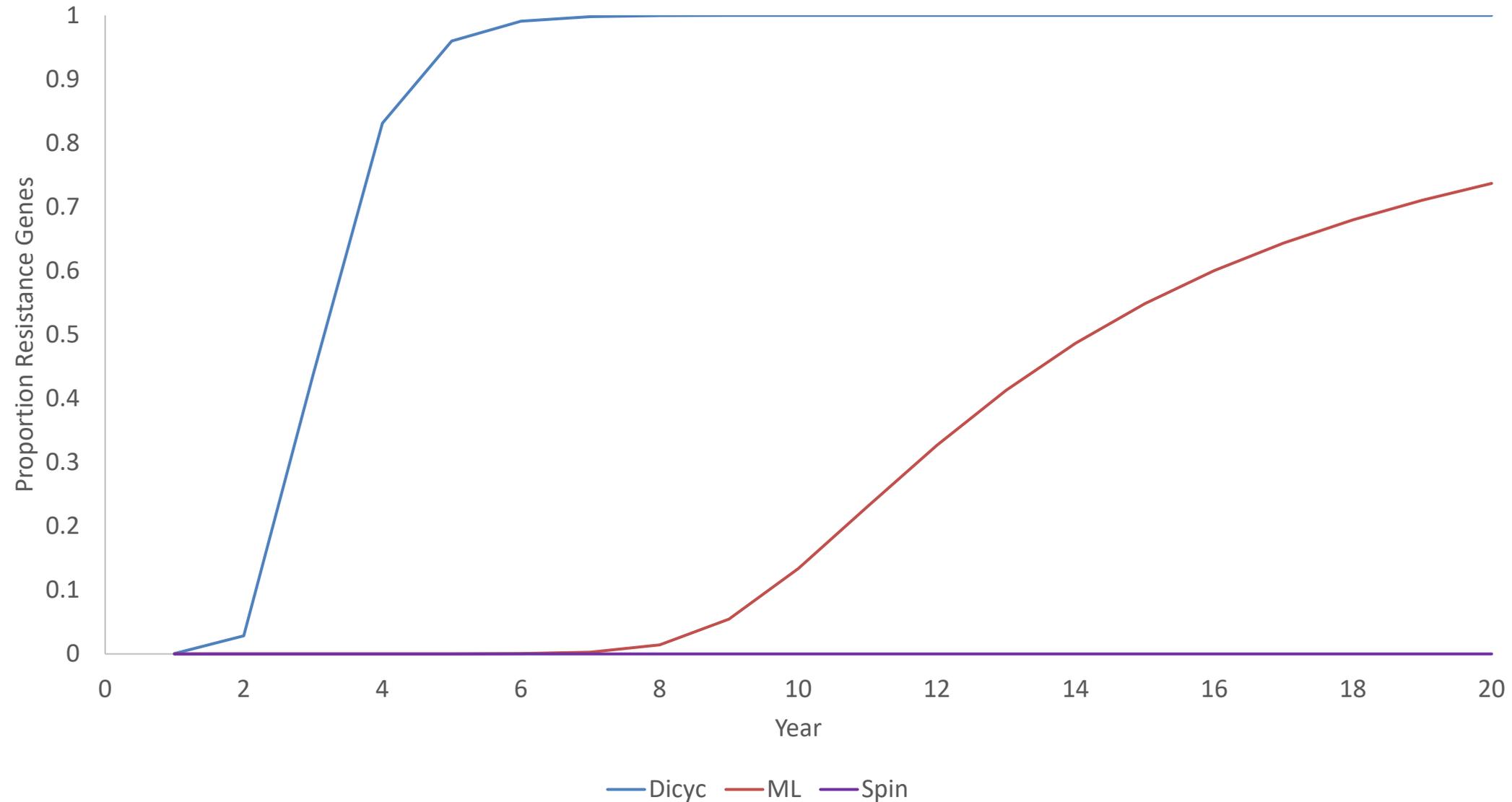
This will eventually lose several chemical groups,
unless there is a fitness disadvantage for resistant flies.

Rotations for flystrike prevention are not a long term solution.

Combinations may protect each other from increasing resistance



Combinations must have very similar protection periods

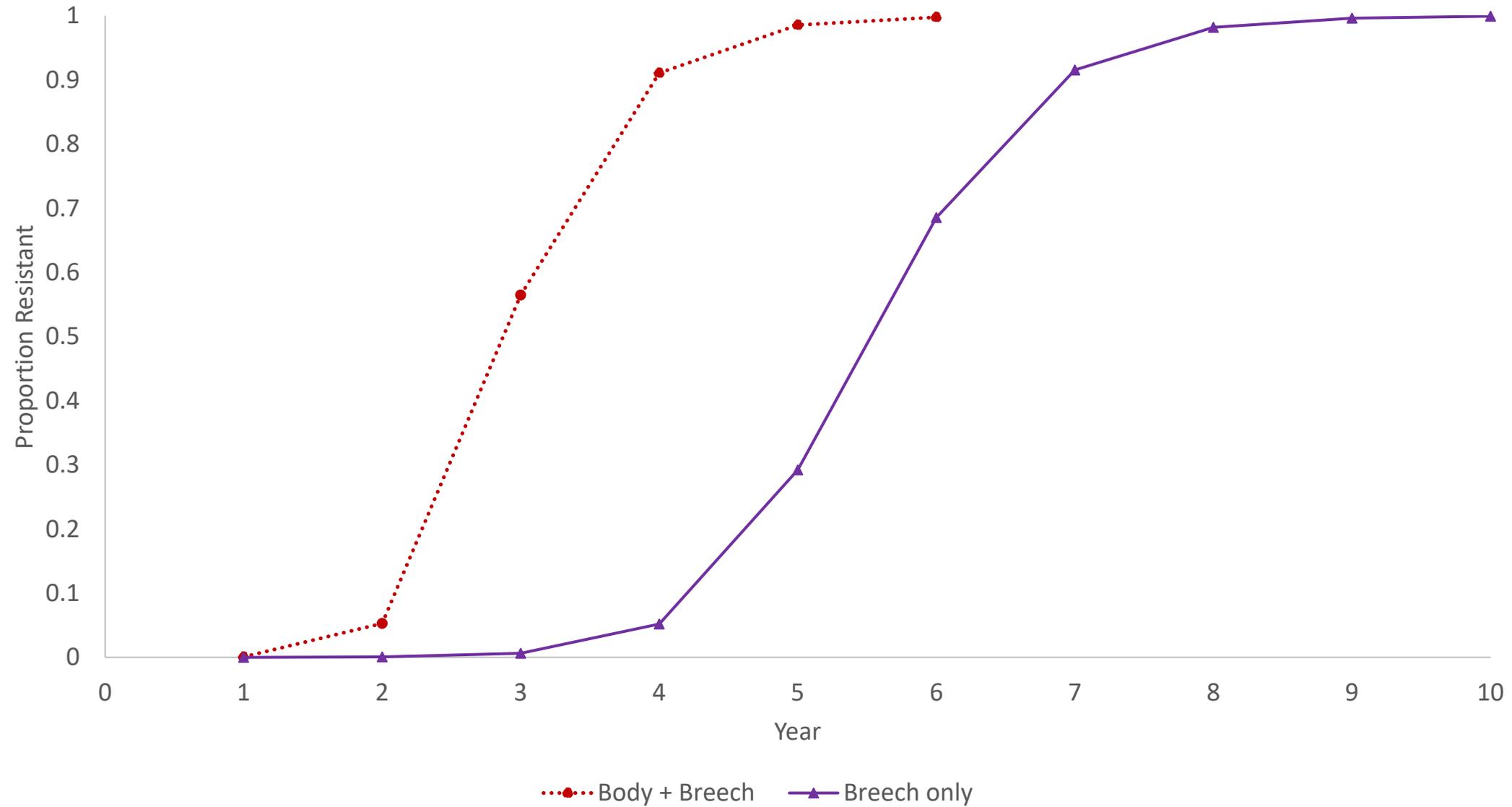


Combinations

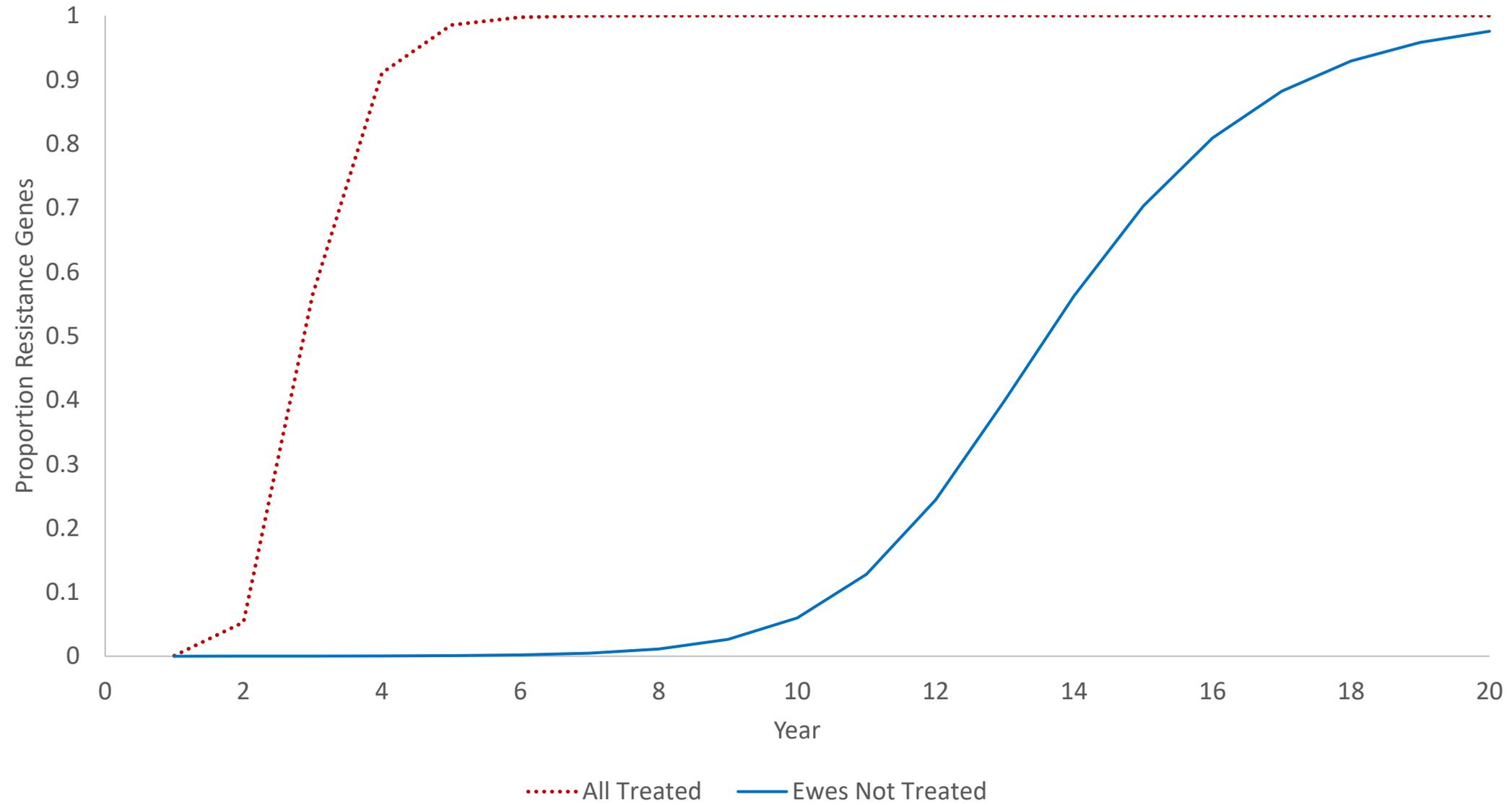
There are no suitable combinations currently registered.
Products should not be mixed unless registered as a mixture.
Combinations will only be useful if all three products have almost identical periods of protection and no cross-resistance.
If there is already resistance to any of the products in the mix, then that product will not protect the others.

Combinations are not likely to be a long-term solution for flystrike.

Refugia – Prevention for breech strike, but not body strike



Refugia – Prevention for lambs but not ewes



Refugia

Flies that reproduce on untreated sheep, or off-sheep do not increase resistance.

These flies may have a large effect on delaying resistance development.

But this requires leaving some sheep unprotected.

So only suitable under conditions of low fly risk.

Extra monitoring is essential.

Further work

University of Melbourne will provide information on -

- Degree of dominance of resistance for each chemical group
- Genes that confer cross-resistance between chemical groups
- Fitness disadvantage, if any, associated with resistant genes

DPI NSW will provide real world toxicological, resistance, and chemical use histories for validation.

Determine current levels of resistance in local fly populations across Australia

Produce aggregated data for regions to inform effective resistance management and flystrike control options

Summary

Resistance will increase if all sheep are treated every year.

Rotation will delay but not prevent resistance.

Combinations are not likely to be a long term solution.

Refugia can delay resistance, but leave some sheep unprotected.

Use other management to reduce treatment, if possible.

Breed sheep that are resistant to flystrike.



This publication is based on information presented at the Australian Wool Innovation Limited (AWI) Flystrike RD&E Technical Forum held on 10th August 2022. Some information in this publication has been contributed by one or more third parties and licenced to AWI, and AWI has not verified whether this information is correct. This publication should only be used as a general aid and is not a substitute for specific advice. To the extent permitted by law, we exclude all liability for loss or damage arising from the use of the information in this publication. Except to the extent permitted under Copyright Law no part of this publication may be reproduced by any process, electronic or otherwise without the specific written permission of AWI. Neither may information be stored electronically in any form whatsoever without such permission. AWI is grateful for its funding, which is primarily provided by Australian woolgrowers through a wool levy and by the Australian Government which provides a matching contribution for eligible R&D activities. © 2022 Australian Wool Innovation Limited. All rights reserved.