```
      name:  <unnamed>
       log:  /Users/SamRowe1/Dropbox/R backup/SDCT - R/SDCT QTR LOG.smcl
  log type:  smcl
 opened on:   2 Jul 2019, 12:21:05

 1 . do "/var/folders/9d/jztlcdt119jcdw9bmltvxmd40000gp/T//SD17867.000000"

 2 .
 3 . ****************************
 4 . *    SDCT QTR outcomes
 5 . *        Sam Rowe
 6 . *   samrowe101@gmail.com
 7 . *           March 2019
 8 . ****************************
 9 .
10 . *Only marginal standardization will be conducted in Stata. All other analyses conduc
11 . *Outcome 1: Cure
12 .
13 . *Step 3: Create full model with all potential covariates
14 . meglm Cure i.Tx Parity DOSCC DOMY i.PrevCM DODIM PCSampDIM || FARMID: || CowID:, fam

  Fitting fixed-effects model:

  Iteration 0:   log likelihood = -350.97942
  Iteration 1:   log likelihood =  -349.4617
  Iteration 2:   log likelihood = -349.46025
  Iteration 3:   log likelihood = -349.46025

  Refining starting values:

  Grid node 0:   log likelihood = -347.25869

  Fitting full model:

  Iteration 0:   log likelihood = -347.25869  (not concave)
  Iteration 1:   log likelihood = -344.04076
  Iteration 2:   log likelihood = -343.72424  (backed up)
  Iteration 3:   log likelihood = -343.63129
  Iteration 4:   log likelihood = -343.53269
  Iteration 5:   log likelihood =  -343.5297
  Iteration 6:   log likelihood =  -343.5297

  Mixed-effects GLM                               Number of obs     =        934
  Family:               binomial
  Link:                    logit

  ------------------------------------------------------------------------------
                  |     No. of       Observations per Group
```

Group Variable	Groups	Minimum	Average	Maximum
FARMID	**7**	**29**	**133.4**	**432**
CowID	**598**	**1**	**1.6**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**8**) = **3.56**

Log likelihood = **-343.5297** Prob > chi2 = **0.8945**

Cure	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**.0630215**	**.2953295**	**0.21**	**0.831**	**-.5158137**	**.6418567**
2	**.1614251**	**.3036173**	**0.53**	**0.595**	**-.4336539**	**.7565042**
Parity	**-.0424908**	**.1577721**	**-0.27**	**0.788**	**-.3517183**	**.2667368**
DOSCC	**-.0979108**	**.1205049**	**-0.81**	**0.417**	**-.3340962**	**.1382745**
DOMY	**-.0053816**	**.0163535**	**-0.33**	**0.742**	**-.0374338**	**.0266707**
PrevCM						
1	**.4836847**	**.3628774**	**1.33**	**0.183**	**-.227542**	**1.194911**
DODIM	**-.0025398**	**.0027663**	**-0.92**	**0.359**	**-.0079615**	**.002882**
PCSampDIM	**-.0267766**	**.05171**	**-0.52**	**0.605**	**-.1281264**	**.0745732**
_cons	**4.197029**	**1.364847**	**3.08**	**0.002**	**1.521978**	**6.872081**
FARMID						
var(_cons)	**.1813986**	**.197816**			**.0213991**	**1.537706**
FARMID>CowID						
var(_cons)	**1.197882**	**.6767427**			**.3958479**	**3.624932**

LR test vs. logistic model: chi2(**2**) = **11.86** Prob > chi2 = **0.0027**

Note: LR test is conservative and provided only for reference.

```
15 .
16 . *Step 4: Effect measure modification
17 . *Will test Tx:Farm, Tx:Parity, Tx:PrevCM
18 .
19 . *Step 4a: Tx:Farm
20 . meglm Cure i.Tx##i.FARMID Parity DOSCC DOMY i.PrevCM DODIM PCSampDIM || CowID:, fami
note: 1.Tx#2.FARMID != 0 predicts success perfectly
      1.Tx#2.FARMID dropped and 10 obs not used

note: 1.Tx#6.FARMID != 0 predicts success perfectly
      1.Tx#6.FARMID dropped and 8 obs not used
```

```
note: 2.Tx#1.FARMID != 0 predicts success perfectly
      2.Tx#1.FARMID dropped and 11 obs not used

note: 2.Tx#6.FARMID != 0 predicts success perfectly
      2.Tx#6.FARMID dropped and 18 obs not used

note: 2.Tx#7.FARMID != 0 predicts success perfectly
      2.Tx#7.FARMID dropped and 31 obs not used

note: 3.Tx#1.FARMID != 0 predicts success perfectly
      3.Tx#1.FARMID dropped and 10 obs not used

note: 3.Tx#7.FARMID != 0 predicts success perfectly
      3.Tx#7.FARMID dropped and 22 obs not used

note: 2.Tx#5.FARMID omitted because of collinearity
note: 3.Tx#2.FARMID omitted because of collinearity
note: 3.Tx#5.FARMID omitted because of collinearity
note: 3.Tx#6.FARMID omitted because of collinearity

Fitting fixed-effects model:

Iteration 0:   log likelihood = -332.17091
Iteration 1:   log likelihood = -330.84226
Iteration 2:   log likelihood = -330.83988
Iteration 3:   log likelihood = -330.83988

Refining starting values:

Grid node 0:   log likelihood = -332.42527

Fitting full model:

Iteration 0:   log likelihood = -332.42527
Iteration 1:   log likelihood = -329.44315
Iteration 2:   log likelihood = -328.42039
Iteration 3:   log likelihood = -328.40664
Iteration 4:   log likelihood =  -328.4066
Iteration 5:   log likelihood =  -328.4066

Mixed-effects GLM                               Number of obs     =        824
Family:                  binomial
Link:                       logit
Group variable:             CowID               Number of groups  =        505

                                                Obs per group:
                                                              min =          1
                                                              avg =        1.6
                                                              max =          5
```

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**19**) = **9.81**

Log likelihood = **-328.4066** Prob > chi2 = **0.9575**

Cure	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	-.6153327	.7954483	-0.77	0.439	-2.174383	.9437174
2	-.2061446	.8456079	-0.24	0.807	-1.863506	1.451216
FARMID						
2	-.6432378	1.774609	-0.36	0.717	-4.121407	2.834931
3	.0057473	1.385851	0.00	0.997	-2.710471	2.721966
4	-.7228662	1.307936	-0.55	0.580	-3.286373	1.84064
5	.2679399	1.398644	0.19	0.848	-2.473352	3.009231
6	.131918	1.744342	0.08	0.940	-3.28693	3.550766
7	-.3606119	1.478568	-0.24	0.807	-3.258552	2.537328
Tx#FARMID						
0#2	0	(empty)				
0#6	0	(empty)				
1#1	0	(empty)				
1#2	1.377906	1.702017	0.81	0.418	-1.957987	4.713799
1#3	.4657346	1.023289	0.46	0.649	-1.539874	2.471343
1#4	.6913465	.8747548	0.79	0.429	-1.023141	2.405834
1#5	0	(omitted)				
1#6	0	(empty)				
1#7	0	(empty)				
2#1	0	(empty)				
2#2	0	(omitted)				
2#3	.0701329	1.068705	0.07	0.948	-2.02449	2.164755
2#4	.538821	.9366071	0.58	0.565	-1.296895	2.374537
2#5	0	(omitted)				
2#6	0	(omitted)				
2#7	0	(empty)				
Parity	-.0368471	.158912	-0.23	0.817	-.3483088	.2746146
DOSCC	-.0826244	.1211786	-0.68	0.495	-.3201301	.1548812
DOMY	-.0052291	.0165485	-0.32	0.752	-.0376636	.0272053
PrevCM						
1	.4903174	.3604001	1.36	0.174	-.2160538	1.196688
DODIM	-.0029538	.0027678	-1.07	0.286	-.0083786	.002471
PCSampDIM	.0019829	.0541207	0.04	0.971	-.1040917	.1080575
_cons	3.975348	1.857073	2.14	0.032	.3355525	7.615143
CowID						

```
   var(_cons)|    .993516   .6029097                      .3024321    3.263787
-------------------------------------------------------------------------------
   LR test vs. logistic model: chibar2(01) = 4.87        Prob >= chibar2 = 0.0137

21 . testparm Tx#FARMID

    ( 1)  [Cure]2.Tx#2.FARMID = 0
    ( 2)  [Cure]2.Tx#3.FARMID = 0
    ( 3)  [Cure]2.Tx#4.FARMID = 0
    ( 4)  [Cure]3.Tx#3.FARMID = 0
    ( 5)  [Cure]3.Tx#4.FARMID = 0

              chi2(  5) =    1.51
            Prob > chi2 =    0.9119

22 .
23 . *Step 4b: Tx: Parity
24 . meglm Cure i.Tx##i.Parity DOSCC DOMY i.PrevCM DODIM PCSampDIM|| FARMID:|| CowID:, fa

   Fitting fixed-effects model:

   Iteration 0:   log likelihood = -347.41961
   Iteration 1:   log likelihood = -344.43194
   Iteration 2:   log likelihood = -344.41461
   Iteration 3:   log likelihood =  -344.4146

   Refining starting values:

   Grid node 0:   log likelihood = -342.46088

   Fitting full model:

   Iteration 0:   log likelihood = -342.46088  (not concave)
   Iteration 1:   log likelihood = -340.47107  (not concave)
   Iteration 2:   log likelihood = -339.61852
   Iteration 3:   log likelihood = -339.03458
   Iteration 4:   log likelihood = -338.80358
   Iteration 5:   log likelihood = -338.78959
   Iteration 6:   log likelihood = -338.78946
   Iteration 7:   log likelihood = -338.78946

   Mixed-effects GLM                               Number of obs     =        934
   Family:                  binomial
   Link:                       logit

-------------------------------------------------------------------------------
                |     No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+--------------------------------------------------------------
```

FARMID	**7**	**29**	**133.4**	**432**
CowID	**598**	**1**	**1.6**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**13**) = **11.83**
Log likelihood = **-338.78946** Prob > chi2 = **0.5416**

Cure	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**.2315985**	**.4318339**	**0.54**	**0.592**	**-.6147805**	**1.077977**
2	**.9625776**	**.4951733**	**1.94**	**0.052**	**-.0079444**	**1.933099**
Parity						
2	**-.085348**	**.4599586**	**-0.19**	**0.853**	**-.9868504**	**.8161544**
3	**1.050123**	**.6226753**	**1.69**	**0.092**	**-.1702981**	**2.270544**
Tx#Parity						
1#2	**.1208669**	**.6647355**	**0.18**	**0.856**	**-1.181991**	**1.423725**
1#3	**-1.028261**	**.7797511**	**-1.32**	**0.187**	**-2.556545**	**.5000233**
2#2	**-.8669613**	**.6811266**	**-1.27**	**0.203**	**-2.201945**	**.4680222**
2#3	**-2.174915**	**.8420039**	**-2.58**	**0.010**	**-3.825213**	**-.524618**
DOSCC	**-.0806853**	**.1193036**	**-0.68**	**0.499**	**-.3145159**	**.1531454**
DOMY	**-.0064929**	**.0160087**	**-0.41**	**0.685**	**-.0378695**	**.0248836**
PrevCM						
1	**.4329826**	**.3546984**	**1.22**	**0.222**	**-.2622136**	**1.128179**
DODIM	**-.0025959**	**.0027218**	**-0.95**	**0.340**	**-.0079304**	**.0027387**
PCSampDIM	**-.029054**	**.0509525**	**-0.57**	**0.569**	**-.1289191**	**.0708112**
_cons	**3.886378**	**1.324212**	**2.93**	**0.003**	**1.29097**	**6.481786**
FARMID						
var(_cons)	**.195338**	**.1995793**			**.0263696**	**1.447006**
FARMID>CowID						
var(_cons)	**.9865625**	**.635185**			**.2793123**	**3.484651**

LR test vs. logistic model: chi2(**2**) = **11.25** Prob > chi2 = **0.0036**

Note: LR test is conservative and provided only for reference.

```
25 . testparm Tx#Parity

 ( 1)  [Cure]2.Tx#2.Parity = 0
 ( 2)  [Cure]2.Tx#3.Parity = 0
 ( 3)  [Cure]3.Tx#2.Parity = 0
```

```
 ( 4)  [Cure]3.Tx#3.Parity = 0

           chi2(  4) =    7.40
         Prob > chi2 =    0.1161

26 .
27 . *Step 4c: Tx:PrevCM
28 . meglm Cure i.Tx##i.PrevCM DOSCC DOMY Parity DODIM PCSampDIM || FARMID:|| CowID:, fam

Fitting fixed-effects model:

Iteration 0:   log likelihood = -350.05372
Iteration 1:   log likelihood = -348.07459
Iteration 2:   log likelihood = -348.05966
Iteration 3:   log likelihood = -348.05964

Refining starting values:

Grid node 0:   log likelihood = -345.90448

Fitting full model:

Iteration 0:   log likelihood = -345.90448  (not concave)
Iteration 1:   log likelihood = -342.64265
Iteration 2:   log likelihood = -342.34071
Iteration 3:   log likelihood = -342.17217
Iteration 4:   log likelihood = -342.11636
Iteration 5:   log likelihood = -342.11516
Iteration 6:   log likelihood = -342.11516

Mixed-effects GLM                               Number of obs     =        934
Family:                  binomial
Link:                       logit

------------------------------------------------------------------------------
                |        No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+-------------------------------------------------------------
          FARMID |          7         29      133.4        432
           CowID |        598          1        1.6          4
------------------------------------------------------------------------------

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(10)     =       5.81
Log likelihood = -342.11516                     Prob > chi2       =     0.8306
------------------------------------------------------------------------------
        Cure |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

Tx						
1	-.0080293	.3219444	-0.02	0.980	-.6390287	.6229702
2	.2728611	.3326607	0.82	0.412	-.3791418	.924864
PrevCM						
1	.5365124	.5541259	0.97	0.333	-.5495545	1.622579
Tx#PrevCM						
1#1	.6937262	.9030079	0.77	0.442	-1.076137	2.463589
2#1	-.8972941	.8471407	-1.06	0.290	-2.557659	.7630713
DOSCC	-.1194005	.1215808	-0.98	0.326	-.3576945	.1188934
DOMY	-.0067386	.0164079	-0.41	0.681	-.0388975	.0254203
Parity	-.0394723	.1592814	-0.25	0.804	-.3516581	.2727134
DODIM	-.0026349	.0027981	-0.94	0.346	-.0081191	.0028494
PCSampDIM	-.0233892	.0521212	-0.45	0.654	-.1255449	.0787664
_cons	4.337472	1.37205	3.16	0.002	1.648304	7.02664
FARMID						
var(_cons)	.1782429	.1966366			.0205103	1.549006
FARMID>CowID						
var(_cons)	1.236526	.6840638			.418125	3.656791

LR test vs. logistic model: chi2(2) = **11.89** Prob > chi2 = **0.0026**

Note: LR test is conservative and provided only for reference.

```
29 . testparm Tx#PrevCM

 ( 1)  [Cure]2.Tx#2.PrevCM = 0
 ( 2)  [Cure]3.Tx#2.PrevCM = 0

           chi2(  2) =    2.73
         Prob > chi2 =    0.2550

30 .
31 . *Step 5: Removing unnecessary covariates using 10% rule. Will do so in this order:
32 .
33 . *DOMY DODIM PCSampDIM PrevCM DOSCC Parity
34 . *Step 5a: full model
35 . meglm Cure i.Tx i.Parity DOSCC DOMY i.PrevCM DODIM PCSampDIM || FARMID: || CowID:, o
   > git)

Fitting fixed-effects model:

Iteration 0:   log likelihood =   -350.437
Iteration 1:   log likelihood =  -348.7516
Iteration 2:   log likelihood = -348.75047
```

```
Iteration 3:   log likelihood = -348.75047

Refining starting values:

Grid node 0:   log likelihood = -346.52437

Fitting full model:

Iteration 0:   log likelihood = -346.52437  (not concave)
Iteration 1:   log likelihood = -344.48269  (not concave)
Iteration 2:   log likelihood = -343.61991
Iteration 3:   log likelihood = -343.24243
Iteration 4:   log likelihood = -342.85845
Iteration 5:   log likelihood = -342.81198
Iteration 6:   log likelihood = -342.81116
Iteration 7:   log likelihood = -342.81116

Mixed-effects GLM                               Number of obs     =        934
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**29**	**133.4**	**432**
CowID	**598**	**1**	**1.6**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(9)      =       5.02
Log likelihood = -342.81116                     Prob > chi2       =     0.8326
```

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.032489**	**.3042975**	**0.11**	**0.914**	**.5794515**	**1.839727**
2	**1.166573**	**.3512019**	**0.51**	**0.609**	**.6466272**	**2.104601**
Parity						
2	**.7214776**	**.2044126**	**-1.15**	**0.249**	**.4140533**	**1.257157**
3	**.9705136**	**.3133323**	**-0.09**	**0.926**	**.5154535**	**1.827316**
DOSCC	**.9140688**	**.1095001**	**-0.75**	**0.453**	**.7227862**	**1.155974**
DOMY	**.995246**	**.0161419**	**-0.29**	**0.769**	**.9641061**	**1.027392**
PrevCM						
1	**1.616928**	**.580557**	**1.34**	**0.181**	**.7999583**	**3.268241**

DODIM	.9974022	.0027395	-0.95	0.344	.9920474	1.002786
PCSampDIM	.9718037	.0496944	-0.56	0.576	.8791263	1.074251
_cons	67.6825	90.70151	3.15	0.002	4.895295	935.7804
FARMID						
var(_cons)	.1867491	.1969007			.0236475	1.474793
FARMID>CowID						
var(_cons)	1.129688	.6638476			.3570754	3.574019

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **11.88** Prob > chi2 = **0.0026**

Note: LR test is conservative and provided only for reference.

```
36 .
37 . *Step 5b: remove DOMY
38 . meglm Cure i.Tx i.Parity DOSCC i.PrevCM DODIM PCSampDIM || FARMID: || CowID:, or fam
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-350.70242**
Iteration 1: log likelihood = **-349.1285**
Iteration 2: log likelihood = **-349.12719**
Iteration 3: log likelihood = **-349.12719**

Refining starting values:

Grid node 0: log likelihood = **-346.51542**

Fitting full model:

Iteration 0: log likelihood = **-346.51542** (not concave)
Iteration 1: log likelihood = **-344.49734** (not concave)
Iteration 2: log likelihood = **-343.63925**
Iteration 3: log likelihood = **-343.07358**
Iteration 4: log likelihood = **-342.86189**
Iteration 5: log likelihood = **-342.85457**
Iteration 6: log likelihood = **-342.85452**
Iteration 7: log likelihood = **-342.85452**

Mixed-effects GLM Number of obs = **934**
Family: **binomial**
Link: **logit**

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum

FARMID	**7**	**29**	**133.4**	**432**
CowID	**598**	**1**	**1.6**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**8**) = **4.96**
Log likelihood = **-342.85452** Prob > chi2 = **0.7614**

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.031242**	**.3033449**	**0.10**	**0.917**	**.5793958**	**1.835463**
2	**1.164983**	**.3499961**	**0.51**	**0.611**	**.6465361**	**2.099163**
Parity						
2	**.7214105**	**.2040092**	**-1.15**	**0.248**	**.4144474**	**1.255728**
3	**.9736742**	**.3137365**	**-0.08**	**0.934**	**.5177739**	**1.830995**
DOSCC	**.922068**	**.1067162**	**-0.70**	**0.483**	**.7349344**	**1.156851**
PrevCM						
1	**1.617348**	**.5799091**	**1.34**	**0.180**	**.8009407**	**3.265927**
DODIM	**.9975546**	**.0026854**	**-0.91**	**0.363**	**.9923052**	**1.002832**
PCSampDIM	**.9729236**	**.0495517**	**-0.54**	**0.590**	**.8804941**	**1.075056**
_cons	**53.9168**	**58.53637**	**3.67**	**0.000**	**6.420844**	**452.7476**
FARMID						
var(_cons)	**.1926407**	**.1981272**			**.0256628**	**1.44608**
FARMID>CowID						
var(_cons)	**1.117709**	**.6609648**			**.3507235**	**3.561989**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **12.55** Prob > chi2 = **0.0019**

Note: LR test is conservative and provided only for reference.

```
39 . *Changed by <10%. DOMY stays out
40 .
41 . *Step 5c: remove DODIM
42 . meglm Cure i.Tx i.Parity DOSCC i.PrevCM PCSampDIM || FARMID: || CowID:, or family(bi
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-351.14402**
Iteration 1: log likelihood = **-349.68869**

```
Iteration 2:   log likelihood = -349.68729
Iteration 3:   log likelihood = -349.68729

Refining starting values:

Grid node 0:   log likelihood = -346.90934

Fitting full model:

Iteration 0:   log likelihood = -346.90934  (not concave)
Iteration 1:   log likelihood = -344.88803  (not concave)
Iteration 2:   log likelihood = -344.04224
Iteration 3:   log likelihood = -343.73234
Iteration 4:   log likelihood = -343.31664
Iteration 5:   log likelihood = -343.26138
Iteration 6:   log likelihood = -343.26029
Iteration 7:   log likelihood = -343.26029

Mixed-effects GLM                               Number of obs     =        934
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**29**	**133.4**	**432**
CowID	**598**	**1**	**1.6**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(7)      =       4.13
Log likelihood = -343.26029                     Prob > chi2       =     0.7651
```

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.006052**	**.2956315**	**0.02**	**0.984**	**.5655774**	**1.789569**
2	**1.153325**	**.3473712**	**0.47**	**0.636**	**.6391123**	**2.081258**
Parity						
2	**.728767**	**.2065633**	**-1.12**	**0.264**	**.4181405**	**1.27015**
3	**.9826146**	**.3174885**	**-0.05**	**0.957**	**.5216209**	**1.851021**
DOSCC	**.9096542**	**.1047471**	**-0.82**	**0.411**	**.725872**	**1.139968**
PrevCM						
1	**1.600664**	**.5753971**	**1.31**	**0.191**	**.7912532**	**3.238061**

PCSampDIM	.9716917	.0495228	-0.56	0.573	.8793192	1.073768
_cons	26.46978	19.30999	4.49	0.000	6.335623	110.5888
FARMID						
var(_cons)	.1919828	.1967903			.0257481	1.431459
FARMID>CowID						
var(_cons)	1.147467	.666526			.3675407	3.58241

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **12.85** Prob > chi2 = **0.0016**

Note: LR test is conservative and provided only for reference.

```
43 . *Changed by <10%. DODIM stays out
44 .
45 . *Step 5d: remove PCSampDIM
46 . meglm Cure i.Tx i.Parity DOSCC i.PrevCM || FARMID: || CowID:, or family(binomial) li
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-351.521**
Iteration 1: log likelihood = **-350.13479**
Iteration 2: log likelihood = **-350.13313**
Iteration 3: log likelihood = **-350.13313**

Refining starting values:

Grid node 0: log likelihood = **-347.11941**

Fitting full model:

Iteration 0: log likelihood = **-347.11941** (not concave)
Iteration 1: log likelihood = **-345.14656** (not concave)
Iteration 2: log likelihood = **-344.29259**
Iteration 3: log likelihood = **-343.89051**
Iteration 4: log likelihood = **-343.54933**
Iteration 5: log likelihood = **-343.51863**
Iteration 6: log likelihood = **-343.51817**
Iteration 7: log likelihood = **-343.51816**

Mixed-effects GLM Number of obs = **935**
Family: **binomial**
Link: **logit**

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum

FARMID	**7**	**29**	**133.6**	**432**
CowID	**599**	**1**	**1.6**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**6**) = **3.85**
Log likelihood = **-343.51816** Prob > chi2 = **0.6963**

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.0172**	**.2969191**	**0.06**	**0.953**	**.57404**	**1.802482**
2	**1.159567**	**.3481599**	**0.49**	**0.622**	**.6437577**	**2.088666**
Parity						
2	**.7331329**	**.2070609**	**-1.10**	**0.272**	**.4214784**	**1.275235**
3	**.9872955**	**.3183056**	**-0.04**	**0.968**	**.5248298**	**1.857273**
DOSCC	**.9075697**	**.1044614**	**-0.84**	**0.399**	**.7242802**	**1.137243**
PrevCM						
1	**1.605251**	**.5762427**	**1.32**	**0.187**	**.7942988**	**3.244156**
_cons	**22.79676**	**15.24329**	**4.68**	**0.000**	**6.14764**	**84.53525**
FARMID						
var(_cons)	**.212114**	**.2119145**			**.0299342**	**1.50304**
FARMID>CowID						
var(_cons)	**1.133847**	**.6653042**			**.3590023**	**3.58106**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **13.23** Prob > chi2 = **0.0013**

Note: LR test is conservative and provided only for reference.

```
47 . *Changed by <10%. PCSampDIM stays out
48 .
49 . *Step 5e: remove PrevCM
50 . meglm Cure i.Tx i.Parity DOSCC || FARMID: || CowID:, or family(binomial) link(logit)
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-352.35019**
Iteration 1: log likelihood = **-351.27832**
Iteration 2: log likelihood = **-351.27542**
Iteration 3: log likelihood = **-351.27542**

```
Refining starting values:

Grid node 0:   log likelihood = -348.04582

Fitting full model:

Iteration 0:   log likelihood = -348.04582  (not concave)
Iteration 1:   log likelihood = -346.05509  (not concave)
Iteration 2:   log likelihood = -345.20918
Iteration 3:   log likelihood = -344.62142
Iteration 4:   log likelihood =  -344.4343
Iteration 5:   log likelihood = -344.42991
Iteration 6:   log likelihood = -344.42989

Mixed-effects GLM                               Number of obs     =        935
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**29**	**133.6**	**432**
CowID	**599**	**1**	**1.6**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(5)      =       2.11
Log likelihood = -344.42989                     Prob > chi2       =     0.8341
```

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	.9905228	.2902217	-0.03	0.974	.5577809	1.758998
2	1.11603	.3356713	0.36	0.715	.6189533	2.012306
Parity						
2	.7635097	.2157108	-0.96	0.340	.4388626	1.328313
3	1.068914	.3413763	0.21	0.835	.571606	1.99889
DOSCC	.9225645	.1055088	-0.70	0.481	.7373086	1.154368
_cons	22.68037	15.18691	4.66	0.000	6.104928	84.25968
FARMID						
var(_cons)	.2105352	.211072			.0295089	1.502092
FARMID>CowID						

```
   var(_cons)|   1.184413   .6728698                      .3889843    3.606403
-------------------------------------------------------------------------------
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 13.69               Prob > chi2 = 0.0011

Note: LR test is conservative and provided only for reference.

51 . *Changed by <10%. PrevCM stays out
52 .
53 . *Step 5f: remove DOSCC
54 . meglm Cure i.Tx i.Parity || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -352.69991
Iteration 1:   log likelihood = -351.74072
Iteration 2:   log likelihood = -351.73754
Iteration 3:   log likelihood = -351.73754

Refining starting values:

Grid node 0:   log likelihood = -348.27189

Fitting full model:

Iteration 0:   log likelihood = -348.27189  (not concave)
Iteration 1:   log likelihood = -346.25817  (not concave)
Iteration 2:   log likelihood = -345.43308
Iteration 3:   log likelihood = -344.76925
Iteration 4:   log likelihood = -344.68144
Iteration 5:   log likelihood = -344.67848
Iteration 6:   log likelihood = -344.67848

Mixed-effects GLM                               Number of obs     =        935
Family:                  binomial
Link:                       logit

------------------------------------------------------------------------------
                |     No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+-------------------------------------------------------------
        FARMID  |          7         29      133.6        432
         CowID  |        599          1        1.6          4
------------------------------------------------------------------------------

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(4)      =       1.62
```

Log likelihood = **-344.67848** Prob > chi2 = **0.8058**

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**.9944239**	**.2911706**	**-0.02**	**0.985**	**.560192**	**1.76525**
2	**1.113221**	**.3346209**	**0.36**	**0.721**	**.617619**	**2.006515**
Parity						
2	**.7414364**	**.2071194**	**-1.07**	**0.284**	**.4288365**	**1.281905**
3	**1.024465**	**.321302**	**0.08**	**0.939**	**.5540325**	**1.894343**
_cons	**15.99591**	**6.87199**	**6.45**	**0.000**	**6.891676**	**37.12727**
FARMID						
var(_cons)	**.2148922**	**.2129964**			**.0307984**	**1.499384**
FARMID>CowID						
var(_cons)	**1.185891**	**.6733975**			**.3896705**	**3.609042**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **14.12** Prob > chi2 = **0.0009**

Note: LR test is conservative and provided only for reference.

```
55 . *Changed by <10%. DOSCC stays out
56 .
57 . *Step 5g: remove Parity
58 . meglm Cure i.Tx || FARMID: || CowID:, or family(binomial) link(logit)
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-353.20902**
Iteration 1: log likelihood = **-352.40395**
Iteration 2: log likelihood = **-352.40224**
Iteration 3: log likelihood = **-352.40224**

Refining starting values:

Grid node 0: log likelihood = **-349.0007**

Fitting full model:

Iteration 0: log likelihood = **-349.0007** (not concave)
Iteration 1: log likelihood = **-346.96632** (not concave)
Iteration 2: log likelihood = **-346.14666**
Iteration 3: log likelihood = **-345.4633**
Iteration 4: log likelihood = **-345.40105**

```
Iteration 5:   log likelihood = -345.39982
Iteration 6:   log likelihood = -345.39982

Mixed-effects GLM                               Number of obs     =        935
Family:                 binomial
Link:                      logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**29**	**133.6**	**432**
CowID	**599**	**1**	**1.6**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.15
Log likelihood = -345.39982                     Prob > chi2       =     0.9260
```

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.026987**	**.3011334**	**0.09**	**0.928**	**.5780635**	**1.824545**
2	**1.120379**	**.3387493**	**0.38**	**0.707**	**.6194438**	**2.026412**
_cons	**14.50972**	**5.793927**	**6.70**	**0.000**	**6.633808**	**31.73623**
FARMID						
var(_cons)	**.2096099**	**.2126392**			**.0287018**	**1.530788**
FARMID>CowID						
var(_cons)	**1.24887**	**.6858433**			**.4256592**	**3.664144**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 14.00                 Prob > chi2 = 0.0009

Note: LR test is conservative and provided only for reference.

59 . *Changed by <10%. Parity stays out
60 .
61 . *Step 6: Report final model
62 . meglm Cure i.Tx || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -353.20902
Iteration 1:   log likelihood = -352.40395
```

```
Iteration 2:   log likelihood = -352.40224
Iteration 3:   log likelihood = -352.40224

Refining starting values:

Grid node 0:   log likelihood =  -349.0007

Fitting full model:

Iteration 0:   log likelihood =  -349.0007  (not concave)
Iteration 1:   log likelihood = -346.96632  (not concave)
Iteration 2:   log likelihood = -346.14666
Iteration 3:   log likelihood =  -345.4633
Iteration 4:   log likelihood = -345.40105
Iteration 5:   log likelihood = -345.39982
Iteration 6:   log likelihood = -345.39982

Mixed-effects GLM                               Number of obs     =        935
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**29**	**133.6**	**432**
CowID	**599**	**1**	**1.6**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.15
Log likelihood = -345.39982                     Prob > chi2       =     0.9260
```

Cure	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.026987**	**.3011334**	**0.09**	**0.928**	**.5780635**	**1.824545**
2	**1.120379**	**.3387493**	**0.38**	**0.707**	**.6194438**	**2.026412**
_cons	**14.50972**	**5.793927**	**6.70**	**0.000**	**6.633808**	**31.73623**
FARMID						
var(_cons)	**.2096099**	**.2126392**			**.0287018**	**1.530788**
FARMID>CowID						
var(_cons)	**1.24887**	**.6858433**			**.4256592**	**3.664144**

Note: Estimates are transformed only in the first equation.

```
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 14.00                 Prob > chi2 = 0.0009

Note: LR test is conservative and provided only for reference.

63 . meglm Cure i.Tx || FARMID: || CowID:, family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -353.20902
Iteration 1:   log likelihood = -352.40395
Iteration 2:   log likelihood = -352.40224
Iteration 3:   log likelihood = -352.40224

Refining starting values:

Grid node 0:   log likelihood =  -349.0007

Fitting full model:

Iteration 0:   log likelihood =  -349.0007  (not concave)
Iteration 1:   log likelihood = -346.96632  (not concave)
Iteration 2:   log likelihood = -346.14666
Iteration 3:   log likelihood =  -345.4633
Iteration 4:   log likelihood = -345.40105
Iteration 5:   log likelihood = -345.39982
Iteration 6:   log likelihood = -345.39982

Mixed-effects GLM                               Number of obs     =        935
Family:                binomial
Link:                     logit

------------------------------------------------------------------------------
                |     No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+-------------------------------------------------------------
         FARMID |          7         29      133.6        432
         CowID |        599          1        1.6          4
------------------------------------------------------------------------------

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.15
Log likelihood = -345.39982                     Prob > chi2       =     0.9260
------------------------------------------------------------------------------
        Cure |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          Tx |
           1 |   .0266294   .2932202     0.09   0.928    -.5480716    .6013304
```

2	.1136667	.3023525	0.38	0.707	-.4789333	.7062667
_cons	2.674819	.3993134	6.70	0.000	1.892179	3.457459
FARMID						
var(_cons)	.2096099	.2126392			.0287018	1.530788
FARMID>CowID						
var(_cons)	1.24887	.6858433			.4256592	3.664144

LR test vs. logistic model: chi2(2) = **14.00** Prob > chi2 = **0.0009**

Note: LR test is conservative and provided only for reference.

```
64 . margins Tx
```

Adjusted predictions Number of obs = **935**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**

	Delta-method				
	Margin	Std. Err.	z	P>|z|	[95% Conf. Interval]
Tx					
0	.8968886	.0246228	36.43	0.000	.8486288 .9451485
1	.8990069	.0236782	37.97	0.000	.8525985 .9454152
2	.9056856	.0229709	39.43	0.000	.8606636 .9507077

```
65 . margins, dydx(Tx)
```

Conditional marginal effects Number of obs = **935**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**
dy/dx w.r.t. : **2.Tx 3.Tx**

	Delta-method				
	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
Tx					
1	.0021182	.0233467	0.09	0.928	-.0436405 .0478769
2	.008797	.023463	0.37	0.708	-.0371896 .0547836

Note: dy/dx for factor levels is the discrete change from the base level.

```
66 .
67 . *Report ICC
68 . meglm Cure || FARMID: || CowID:, family(binomial) link(logit)

   Fitting fixed-effects model:

   Iteration 0:   log likelihood = -353.30048
   Iteration 1:   log likelihood = -352.52467
   Iteration 2:   log likelihood = -352.52326
   Iteration 3:   log likelihood = -352.52326

   Refining starting values:

   Grid node 0:   log likelihood = -349.06993

   Fitting full model:

   Iteration 0:   log likelihood = -349.06993  (not concave)
   Iteration 1:   log likelihood = -347.04046  (not concave)
   Iteration 2:   log likelihood =  -346.2167
   Iteration 3:   log likelihood = -345.54666
   Iteration 4:   log likelihood = -345.47877
   Iteration 5:   log likelihood = -345.47707
   Iteration 6:   log likelihood = -345.47707

   Mixed-effects GLM                               Number of obs     =        935
   Family:                  binomial
   Link:                       logit

   ------------------------------------------------------------------------------
                    |     No. of       Observations per Group
    Group Variable  |     Groups    Minimum    Average    Maximum
   -----------------+------------------------------------------------------------
                 FARMID |          7         29       133.6         432
                 CowID |        599          1         1.6           4
   ------------------------------------------------------------------------------

   Integration method: mvaghermite                 Integration pts.  =          7

                                                   Wald chi2(0)      =          .
   Log likelihood = -345.47707                     Prob > chi2       =          .
   ------------------------------------------------------------------------------
                  Cure |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
   ----------------------+-------------------------------------------------------
                 _cons |   2.723899   .3540443     7.69   0.000     2.029985    3.417813
   ----------------------+-------------------------------------------------------
   FARMID                |
      var(_cons) |   .211154   .2139055                      .0289938    1.537775
   ------------------------------------------------------------------------------
```

```
    FARMID>CowID |
       var(_cons)|   1.254913   .6866821                      .4293786    3.667641
------------------------------------------------------------------------------

LR test vs. logistic model: chi2(2) = 14.09                   Prob > chi2 = 0.0009

Note: LR test is conservative and provided only for reference.

69 . estat icc

Intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.      [95% Conf. Interval]
-----------------------------+------------------------------------------------
                      FARMID |   .044398    .042782       .0063969    .2510963
                CowID|FARMID |   .3082605   .1076934      .1420787    .5452763
------------------------------------------------------------------------------

70 .
71 . *Outcome 2: IMI at calving
72 . *Step 2: Create full model with all potential confounders
73 . meglm IMIPC i.Tx Parity DOMY DOSCC PrevCM IMIDO DODIM PCSampDIM|| FARMID: || CowID:,
> logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1972.9477
Iteration 1:   log likelihood = -1969.9397
Iteration 2:   log likelihood = -1969.9381
Iteration 3:   log likelihood = -1969.9381

Refining starting values:

Grid node 0:   log likelihood = -1880.0448

Fitting full model:

Iteration 0:   log likelihood = -1880.0448  (not concave)
Iteration 1:   log likelihood = -1875.7902
Iteration 2:   log likelihood = -1873.2827
Iteration 3:   log likelihood = -1871.0224
Iteration 4:   log likelihood = -1870.9691
Iteration 5:   log likelihood =  -1870.969

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit

------------------------------------------------------------------------------
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**9**) = **29.28**

Log likelihood = **-1870.969** Prob > chi2 = **0.0006**

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.064306**	**.1348285**	**0.49**	**0.623**	**.8302987**	**1.364264**
2	**1.00599**	**.1294595**	**0.05**	**0.963**	**.7817247**	**1.294594**
Parity	**1.139873**	**.0763847**	**1.95**	**0.051**	**.9995769**	**1.299861**
DOMY	**1.003524**	**.0073828**	**0.48**	**0.632**	**.9891581**	**1.018099**
DOSCC	**1.067242**	**.0535843**	**1.30**	**0.195**	**.9672202**	**1.177606**
PrevCM	**1.063003**	**.1592066**	**0.41**	**0.683**	**.7925916**	**1.425671**
IMIDO	**1.468733**	**.1509537**	**3.74**	**0.000**	**1.200765**	**1.796503**
DODIM	**1.001932**	**.0011586**	**1.67**	**0.095**	**.9996633**	**1.004205**
PCSampDIM	**1.04424**	**.0241874**	**1.87**	**0.062**	**.9978939**	**1.09274**
_cons	**.0254663**	**.0162636**	**-5.75**	**0.000**	**.0072838**	**.0890373**
FARMID						
var(_cons)	**.5790281**	**.337259**			**.1848891**	**1.813376**
FARMID>CowID						
var(_cons)	**.7491731**	**.1480878**			**.5085416**	**1.103666**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **197.94** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
74 .
75 . *Step 3: Explore effect measure modification
76 . *Will test Tx:Farm, Tx:Parity, Tx:IMIDO
77 .
78 . *Tx: Farm
79 . meglm IMIPC i.Tx##i.FARMID i.Parity DOMY DOSCC i.PrevCM i.IMIDO DODIM PCSampDIM|| Co
   > link(logit)

   Fitting fixed-effects model:
```

```
Iteration 0:   log likelihood =   -1885.34
Iteration 1:   log likelihood = -1870.7527
Iteration 2:   log likelihood =  -1870.018
Iteration 3:   log likelihood = -1870.0046
Iteration 4:   log likelihood = -1870.0046

Refining starting values:

Grid node 0:   log likelihood = -1861.3111

Fitting full model:

Iteration 0:   log likelihood = -1861.3111
Iteration 1:   log likelihood = -1860.7842
Iteration 2:   log likelihood = -1850.7289
Iteration 3:   log likelihood = -1850.3284
Iteration 4:   log likelihood = -1850.3279
Iteration 5:   log likelihood = -1850.3279

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
Group variable:             CowID               Number of groups  =      1,020

                                                Obs per group:
                                                              min =          1
                                                              avg =        3.7
                                                              max =         14

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(28)     =     198.85
Log likelihood = -1850.3279                     Prob > chi2       =     0.0000
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.563937	.948898	0.74	0.461	.4761725	5.136585
2	.5807539	.4425017	-0.71	0.476	.1304442	2.58559
FARMID						
2	.2885552	.2477606	-1.45	0.148	.0536249	1.552714
3	3.649367	1.869004	2.53	0.011	1.337454	9.95763
4	9.951948	4.678565	4.89	0.000	3.960455	25.00755
5	3.992145	1.917637	2.88	0.004	1.557147	10.23489
6	1.899263	1.32687	0.92	0.359	.4829647	7.468866
7	2.0054	1.086091	1.28	0.199	.6937521	5.796923
Tx#FARMID						

1#2	2.400507	2.560048	0.82	0.412	.2968449	19.41228
1#3	.6087728	.4151604	-0.73	0.467	.1599438	2.317091
1#4	.4746733	.301876	-1.17	0.241	.1364771	1.650934
1#5	1.148546	.7504808	0.21	0.832	.319123	4.133699
1#6	.5654	.5392353	-0.60	0.550	.0872057	3.665783
1#7	.5433689	.4203369	-0.79	0.430	.1192961	2.474933
2#2	6.723449	7.646861	1.68	0.094	.7235771	62.47402
2#3	2.235757	1.839998	0.98	0.328	.4455508	11.21895
2#4	1.208298	.9491019	0.24	0.810	.259159	5.633542
2#5	2.313727	1.856495	1.05	0.296	.4800899	11.15069
2#6	1.765391	1.874891	0.54	0.593	.2202128	14.1527
2#7	1.953289	1.726443	0.76	0.449	.3454775	11.04367
Parity						
2	1.209252	.1501758	1.53	0.126	.947997	1.542505
3	1.314272	.1736397	2.07	0.039	1.014438	1.702726
DOMY	1.003167	.0072287	0.44	0.661	.9890984	1.017435
DOSCC	1.061709	.0520662	1.22	0.222	.9644122	1.168822
PrevCM						
1	1.018864	.1489532	0.13	0.898	.7650234	1.356932
1.IMIDO	1.449771	.147576	3.65	0.000	1.187554	1.769887
DODIM	1.002011	.0011344	1.77	0.076	.9997903	1.004237
PCSampDIM	1.038967	.0233972	1.70	0.090	.9941066	1.085852
_cons	.0131376	.0090715	-6.27	0.000	.0033944	.0508473
CowID						
var(_cons)	.6415448	.1390202			.4195416	.9810226

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chibar2(01) = **39.35** Prob >= chibar2 = **0.0000**

```
80 . testparm Tx#FARMID

 ( 1)  [IMIPC]2.Tx#2.FARMID = 0
 ( 2)  [IMIPC]2.Tx#3.FARMID = 0
 ( 3)  [IMIPC]2.Tx#4.FARMID = 0
 ( 4)  [IMIPC]2.Tx#5.FARMID = 0
 ( 5)  [IMIPC]2.Tx#6.FARMID = 0
 ( 6)  [IMIPC]2.Tx#7.FARMID = 0
 ( 7)  [IMIPC]3.Tx#2.FARMID = 0
 ( 8)  [IMIPC]3.Tx#3.FARMID = 0
 ( 9)  [IMIPC]3.Tx#4.FARMID = 0
 (10)  [IMIPC]3.Tx#5.FARMID = 0
 (11)  [IMIPC]3.Tx#6.FARMID = 0
 (12)  [IMIPC]3.Tx#7.FARMID = 0
```

```
            chi2( 12) =   15.80
          Prob > chi2 =    0.2006

81 .
82 . *Tx:Parity
83 . meglm IMIPC i.Tx##i.Parity DOMY DOSCC i.PrevCM i.IMIDO DODIM PCSampDIM|| FARMID: ||
   > ) link(logit)

   Fitting fixed-effects model:

   Iteration 0:   log likelihood = -1961.9816
   Iteration 1:   log likelihood = -1958.8838
   Iteration 2:   log likelihood = -1958.8824
   Iteration 3:   log likelihood = -1958.8824

   Refining starting values:

   Grid node 0:   log likelihood = -1873.0968

   Fitting full model:

   Iteration 0:   log likelihood = -1873.0968  (not concave)
   Iteration 1:   log likelihood = -1868.7914
   Iteration 2:   log likelihood = -1867.0414
   Iteration 3:   log likelihood = -1863.3268
   Iteration 4:   log likelihood = -1863.0241
   Iteration 5:   log likelihood = -1863.0203
   Iteration 6:   log likelihood = -1863.0203

   Mixed-effects GLM                               Number of obs     =      3,778
   Family:                  binomial
   Link:                       logit

   ------------------------------------------------------------------------------
                    |     No. of       Observations per Group
    Group Variable  |     Groups    Minimum    Average    Maximum
   -----------------+------------------------------------------------------------
                 FARMID |          7        156      539.7      1,242
                 CowID |      1,073          1        3.5          4
   ------------------------------------------------------------------------------

   Integration method: mvaghermite                 Integration pts.  =          7

                                                   Wald chi2(14)     =      45.25
   Log likelihood = -1863.0203                     Prob > chi2       =     0.0000
   ------------------------------------------------------------------------------
          IMIPC | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
   -------------+----------------------------------------------------------------
             Tx |
```

1	.9549044	.1816876	-0.24	0.808	.6576632	1.386488
2	.8320818	.1655725	-0.92	0.356	.5633638	1.228975
Parity						
2	1.311768	.2787919	1.28	0.202	.8648685	1.989592
3	.7827437	.1839262	-1.04	0.297	.4938641	1.2406
Tx#Parity						
1#2	.9709453	.2871704	-0.10	0.921	.5438013	1.733601
1#3	1.62389	.505994	1.56	0.120	.8817132	2.990788
2#2	.7912254	.2374283	-0.78	0.435	.4394146	1.424708
2#3	2.769359	.8868991	3.18	0.001	1.478354	5.187764
DOMY	1.003261	.0072939	0.45	0.654	.9890666	1.017659
DOSCC	1.060503	.0529514	1.18	0.239	.9616363	1.169533
PrevCM						
1	1.054289	.1560901	0.36	0.721	.7887456	1.40923
1.IMIDO	1.475639	.1510596	3.80	0.000	1.207379	1.803503
DODIM	1.001714	.0011489	1.49	0.135	.9994644	1.003968
PCSampDIM	1.046403	.0239728	1.98	0.048	1.000456	1.094459
_cons	.0375454	.0236885	-5.20	0.000	.0109021	.1293017
FARMID						
var(_cons)	.558679	.3252641			.1784806	1.748774
FARMID>CowID						
var(_cons)	.6882053	.1440497			.4566161	1.037253

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **191.72** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
84 . testparm Tx#Parity

 ( 1)  [IMIPC]2.Tx#2.Parity = 0
 ( 2)  [IMIPC]2.Tx#3.Parity = 0
 ( 3)  [IMIPC]3.Tx#2.Parity = 0
 ( 4)  [IMIPC]3.Tx#3.Parity = 0

           chi2(  4) =   15.63
         Prob > chi2 =    0.0036

85 .
86 . *Significant interaction
87 . *Will explore this further
88 . margins Tx#Parity
```

Predictive margins Number of obs = **3,778**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**

	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx#Parity						
0#1	**.1630162**	**.0381247**	**4.28**	**0.000**	**.0882932**	**.2377393**
0#2	**.1966229**	**.043449**	**4.53**	**0.000**	**.1114645**	**.2817813**
0#3	**.1364337**	**.035299**	**3.87**	**0.000**	**.0672489**	**.2056185**
1#1	**.1577389**	**.0363894**	**4.33**	**0.000**	**.086417**	**.2290608**
1#2	**.1868145**	**.043116**	**4.33**	**0.000**	**.1023087**	**.2713203**
1#3	**.1865577**	**.0431494**	**4.32**	**0.000**	**.1019864**	**.2711289**
2#1	**.142739**	**.0344418**	**4.14**	**0.000**	**.0752343**	**.2102436**
2#2	**.1466827**	**.0362533**	**4.05**	**0.000**	**.0756276**	**.2177378**
2#3	**.2416321**	**.0509907**	**4.74**	**0.000**	**.1416921**	**.341572**

```
89 . *It appears that within Algorithm cows, the IMIPC risk is higher in 3rd or greater l
   > actation cows. The opposite was observed in the blanket group, where lact 3 cows had
   > ven the wide confidence intervals around these estimates, I will not report a strati
90 .
91 . *Decision: Use main effects model
92 .
93 . *Tx:Parity
94 . meglm IMIPC i.Tx##i.IMIDO i.Parity DOMY DOSCC i.PrevCM DODIM PCSampDIM|| FARMID: ||
   > ) link(logit)

   Fitting fixed-effects model:

   Iteration 0:   log likelihood = -1971.8906
   Iteration 1:   log likelihood = -1968.8788
   Iteration 2:   log likelihood = -1968.8772
   Iteration 3:   log likelihood = -1968.8772

   Refining starting values:

   Grid node 0:   log likelihood = -1879.4274

   Fitting full model:

   Iteration 0:   log likelihood = -1879.4274  (not concave)
   Iteration 1:   log likelihood = -1875.1663
   Iteration 2:   log likelihood = -1872.5916
   Iteration 3:   log likelihood = -1870.2992
```

```
Iteration 4:   log likelihood =  -1870.242
Iteration 5:   log likelihood = -1870.2418

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(12)     =      30.76
Log likelihood = -1870.2418                     Prob > chi2       =     0.0021
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.120922	.1640263	0.78	0.435	.8414291	1.493251
2	1.089189	.1609832	0.58	0.563	.8152577	1.455163
1.IMIDO	1.691	.2989301	2.97	0.003	1.195833	2.391204
Tx#IMIDO						
1#1	.8526381	.2073981	-0.66	0.512	.5293173	1.373452
2#1	.7651783	.1907092	-1.07	0.283	.4694761	1.24713
Parity						
2	1.206506	.1526585	1.48	0.138	.9415154	1.546078
3	1.287884	.1736213	1.88	0.061	.9888379	1.677368
DOMY	1.003458	.0073703	0.47	0.638	.9891158	1.018008
DOSCC	1.066234	.0536436	1.27	0.202	.9661122	1.176732
PrevCM						
1	1.057345	.1582839	0.37	0.710	.7884829	1.417885
DODIM	1.001948	.0011576	1.68	0.092	.9996815	1.004219
PCSampDIM	1.04437	.0241635	1.88	0.061	.9980679	1.092819
_cons	.0291986	.0185135	-5.57	0.000	.0084266	.1011744
FARMID						
var(_cons)	.5753079	.3351308			.183677	1.801963
FARMID>CowID						

```
  var(_cons)|   .7431065   .1477216                      .5033167    1.097137
------------------------------------------------------------------------------

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 197.27              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

 95 . testparm Tx#IMIDO

 ( 1)  [IMIPC]2.Tx#1.IMIDO = 0
 ( 2)  [IMIPC]3.Tx#1.IMIDO = 0

           chi2(  2) =    1.17
         Prob > chi2 =    0.5571

 96 .
 97 . *Step 4: Remove unnecessary covariates from the model using 10% rule
 98 .
 99 . *I will remove in this order: DODIM DOMY PCSampDIM Parity PrevCM DOSCC IMIDO
100 .
101 . *Step 4a: Full model
102 . meglm IMIPC i.Tx i.IMIDO i.Parity DOMY DOSCC i.PrevCM DODIM PCSampDIM|| FARMID: || C
    >  link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1972.9357
Iteration 1:   log likelihood = -1969.9254
Iteration 2:   log likelihood = -1969.9238
Iteration 3:   log likelihood = -1969.9238

Refining starting values:

Grid node 0:   log likelihood = -1879.9861

Fitting full model:

Iteration 0:   log likelihood = -1879.9861  (not concave)
Iteration 1:   log likelihood =  -1875.724
Iteration 2:   log likelihood = -1873.1668
Iteration 3:   log likelihood = -1870.8826
Iteration 4:   log likelihood = -1870.8268
Iteration 5:   log likelihood = -1870.8266

Mixed-effects GLM                               Number of obs     =      3,778
Family:                binomial
Link:                     logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

Integration method: **mvaghermite** Integration pts. = **7**

Wald chi2(**10**) = **29.56**
Log likelihood = **-1870.8266** Prob > chi2 = **0.0010**

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.068751**	**.1355891**	**0.52**	**0.600**	**.8334644**	**1.370458**
2	**1.007114**	**.1295462**	**0.06**	**0.956**	**.7826865**	**1.295895**
1.IMIDO	**1.466731**	**.1507505**	**3.73**	**0.000**	**1.199124**	**1.79406**
Parity						
2	**1.207196**	**.1528663**	**1.49**	**0.137**	**.9418695**	**1.547265**
3	**1.289672**	**.1739904**	**1.89**	**0.059**	**.9900183**	**1.680024**
DOMY	**1.003475**	**.0073782**	**0.47**	**0.637**	**.9891178**	**1.018041**
DOSCC	**1.064984**	**.0536091**	**1.25**	**0.211**	**.9649292**	**1.175414**
PrevCM						
1	**1.064525**	**.1593264**	**0.42**	**0.676**	**.7938848**	**1.427429**
DODIM	**1.001927**	**.001158**	**1.67**	**0.096**	**.9996601**	**1.0042**
PCSampDIM	**1.044657**	**.0241876**	**1.89**	**0.059**	**.9983099**	**1.093156**
_cons	**.0306514**	**.0193903**	**-5.51**	**0.000**	**.008871**	**.1059076**
FARMID						
var(_cons)	**.5771543**	**.3361326**			**.1843127**	**1.807294**
FARMID>CowID						
var(_cons)	**.7466678**	**.1479631**			**.5063484**	**1.101046**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **198.19** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
103 .
104 . *Step 4b: remove DODIM
105 . meglm IMIPC i.Tx i.IMIDO i.Parity DOMY DOSCC i.PrevCM PCSampDIM|| FARMID: || CowID:,
```

```
> logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1974.0498
Iteration 1:   log likelihood =  -1971.052
Iteration 2:   log likelihood = -1971.0504
Iteration 3:   log likelihood = -1971.0504

Refining starting values:

Grid node 0:   log likelihood = -1881.0078

Fitting full model:

Iteration 0:   log likelihood = -1881.0078  (not concave)
Iteration 1:   log likelihood = -1876.7399
Iteration 2:   log likelihood = -1874.3513
Iteration 3:   log likelihood = -1872.2513
Iteration 4:   log likelihood = -1872.2029
Iteration 5:   log likelihood = -1872.2028

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(9)      =      26.84
Log likelihood = -1872.2028                     Prob > chi2       =     0.0015
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.081468**	**.1373188**	**0.62**	**0.537**	**.843204**	**1.387057**
2	**1.012999**	**.1304689**	**0.10**	**0.920**	**.7870074**	**1.303885**
1.IMIDO	**1.465231**	**.1506413**	**3.72**	**0.000**	**1.197826**	**1.792333**
Parity						
2	**1.204918**	**.1528546**	**1.47**	**0.142**	**.939669**	**1.545041**

3	1.281913	.1732054	1.84	0.066	.9836681	1.670585
DOMY	1.001252	.0072509	0.17	0.863	.9871405	1.015564
DOSCC	1.066214	.0537145	1.27	0.203	.9659663	1.176866
PrevCM						
1	1.089519	.1628479	0.57	0.566	.8128451	1.460367
PCSampDIM	1.044139	.0242295	1.86	0.063	.9977137	1.092724
_cons	.0606924	.0288252	-5.90	0.000	.0239257	.1539582
FARMID						
var(_cons)	.5609821	.3271093			.1789008	1.75908
FARMID>CowID						
var(_cons)	.7554017	.1486741			.5136284	1.110982

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **197.70** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
106 . *Changed by <10%. DODIM stays out
107 .
108 . *Step 4c: remove DOMY
109 . meglm IMIPC i.Tx i.IMIDO i.Parity DOSCC i.PrevCM PCSampDIM|| FARMID: || CowID:, or f
> )

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1975.4529
Iteration 1:   log likelihood = -1972.4662
Iteration 2:   log likelihood = -1972.4646
Iteration 3:   log likelihood = -1972.4646

Refining starting values:

Grid node 0:   log likelihood =  -1880.696

Fitting full model:

Iteration 0:   log likelihood =  -1880.696  (not concave)
Iteration 1:   log likelihood = -1876.4569
Iteration 2:   log likelihood = -1875.1531
Iteration 3:   log likelihood = -1872.8089
Iteration 4:   log likelihood = -1872.2206
Iteration 5:   log likelihood = -1872.2177
Iteration 6:   log likelihood = -1872.2177
```

Mixed-effects GLM — Number of obs = **3,778**
Family: **binomial**
Link: **logit**

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

Integration method: **mvaghermite** — Integration pts. = **7**

Wald chi2(**8**) = **26.82**
Log likelihood = **-1872.2177** — Prob > chi2 = **0.0008**

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.082235**	**.1373363**	**0.62**	**0.533**	**.8439246**	**1.387841**
2	**1.013459**	**.1304933**	**0.10**	**0.917**	**.7874175**	**1.304389**
1.IMIDO	**1.466433**	**.1506025**	**3.73**	**0.000**	**1.199068**	**1.793414**
Parity						
2	**1.204918**	**.1528411**	**1.47**	**0.142**	**.9396899**	**1.545007**
3	**1.281342**	**.1730855**	**1.84**	**0.066**	**.9832947**	**1.669731**
DOSCC	**1.062972**	**.0501627**	**1.29**	**0.196**	**.9690651**	**1.16598**
PrevCM						
1	**1.09126**	**.1627884**	**0.59**	**0.558**	**.8146115**	**1.461861**
PCSampDIM	**1.043941**	**.0241971**	**1.86**	**0.064**	**.9975763**	**1.09246**
_cons	**.0636529**	**.0246084**	**-7.12**	**0.000**	**.029836**	**.1357987**
FARMID						
var(_cons)	**.5624046**	**.3278289**			**.1794232**	**1.762866**
FARMID>CowID						
var(_cons)	**.7551785**	**.1486539**			**.513445**	**1.110722**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **200.49** — Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
110 . *Changed by <10%. DOMY stays out
```

```
111 .
112 . *Step 4d: remove PCSampDIM
113 . meglm IMIPC i.Tx i.IMIDO i.Parity DOSCC i.PrevCM || FARMID: || CowID:, or family(bin

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -2006.6564
    Iteration 1:   log likelihood = -2003.9169
    Iteration 2:   log likelihood = -2003.9151
    Iteration 3:   log likelihood = -2003.9151

    Refining starting values:

    Grid node 0:   log likelihood = -1881.5566

    Fitting full model:

    Iteration 0:   log likelihood = -1881.5566
    Iteration 1:   log likelihood =  -1880.152
    Iteration 2:   log likelihood = -1877.7157
    Iteration 3:   log likelihood = -1875.7699
    Iteration 4:   log likelihood = -1875.6956
    Iteration 5:   log likelihood = -1875.6945
    Iteration 6:   log likelihood = -1875.6945

    Mixed-effects GLM                               Number of obs     =      3,794
    Family:                  binomial
    Link:                       logit

    ------------------------------------------------------------------------------
                 |     No. of       Observations per Group
     Group Variable |    Groups    Minimum    Average    Maximum
    ---------------+--------------------------------------------------------------
                 FARMID |         7        156      542.0      1,242
                  CowID |     1,078          1        3.5          4
    ------------------------------------------------------------------------------

    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(7)      =      23.74
    Log likelihood = -1875.6945                     Prob > chi2       =     0.0013
    ------------------------------------------------------------------------------
           IMIPC | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
    -------------+----------------------------------------------------------------
              Tx |
               1 |   1.071557   .1356024     0.55   0.585     .8361772    1.373196
               2 |   1.011112   .1299895     0.09   0.931     .7859015     1.30086
                 |
         1.IMIDO |   1.457562   .1495204     3.67   0.000     1.192088    1.782154
```

Parity						
2	**1.195244**	**.1513462**	**1.41**	**0.159**	**.9325549**	**1.53193**
3	**1.265434**	**.1706125**	**1.75**	**0.081**	**.9715739**	**1.648173**
DOSCC	**1.065019**	**.0502522**	**1.34**	**0.182**	**.9709433**	**1.168209**
PrevCM						
1	**1.09649**	**.1635346**	**0.62**	**0.537**	**.8185657**	**1.468778**
_cons	**.0779274**	**.0303872**	**-6.54**	**0.000**	**.0362887**	**.1673437**
FARMID						
var(_cons)	**.6821897**	**.3879751**			**.2237739**	**2.0797**
FARMID>CowID						
var(_cons)	**.7545164**	**.1487097**			**.5127469**	**1.110285**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **256.44** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
114 . *Changed by <10%. PCSampdim stays out
115 .
116 . *Step 4e: remove Parity
117 . meglm IMIPC i.Tx i.IMIDO DOSCC i.PrevCM || FARMID: || CowID:, or family(binomial) li

Fitting fixed-effects model:

Iteration 0:   log likelihood = -2007.0395
Iteration 1:   log likelihood = -2004.3244
Iteration 2:   log likelihood = -2004.3226
Iteration 3:   log likelihood = -2004.3226

Refining starting values:

Grid node 0:   log likelihood = -1882.4385

Fitting full model:

Iteration 0:   log likelihood = -1882.4385
Iteration 1:   log likelihood = -1881.1409
Iteration 2:   log likelihood = -1879.1052
Iteration 3:   log likelihood =  -1877.531
Iteration 4:   log likelihood = -1877.4714
Iteration 5:   log likelihood = -1877.4705
Iteration 6:   log likelihood = -1877.4705
```

```
Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**542.0**	**1,242**
CowID	**1,078**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(5)      =      20.23
Log likelihood = -1877.4705                     Prob > chi2       =     0.0011
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.060385**	**.1344509**	**0.46**	**0.644**	**.8270582**	**1.359538**
2	**1.004622**	**.1296456**	**0.04**	**0.971**	**.7801103**	**1.293748**
1.IMIDO	**1.458653**	**.1497232**	**3.68**	**0.000**	**1.192836**	**1.783707**
DOSCC	**1.091994**	**.0495907**	**1.94**	**0.053**	**.9989984**	**1.193647**
PrevCM						
1	**1.135848**	**.1686784**	**0.86**	**0.391**	**.8490106**	**1.519593**
_cons	**.0784321**	**.0304172**	**-6.56**	**0.000**	**.0366763**	**.1677269**
FARMID						
var(_cons)	**.6709123**	**.382098**			**.21973**	**2.048529**
FARMID>CowID						
var(_cons)	**.7729361**	**.149883**			**.5285473**	**1.130325**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 253.70              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

118 . *Changed by <10%. Parity stays out.
119 .
120 . *Step 4f: remove PrevCM
121 . meglm IMIPC i.Tx i.IMIDO DOSCC || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:
```

```
Iteration 0:   log likelihood =  -2008.051
Iteration 1:   log likelihood = -2005.3031
Iteration 2:   log likelihood = -2005.3013
Iteration 3:   log likelihood = -2005.3013

Refining starting values:

Grid node 0:   log likelihood = -1882.8382

Fitting full model:

Iteration 0:   log likelihood = -1882.8382
Iteration 1:   log likelihood = -1881.5595
Iteration 2:   log likelihood = -1879.4886
Iteration 3:   log likelihood = -1877.8979
Iteration 4:   log likelihood = -1877.8379
Iteration 5:   log likelihood =  -1877.837
Iteration 6:   log likelihood =  -1877.837

Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**542.0**	**1,242**
CowID	**1,078**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(4)      =      19.52
Log likelihood =  -1877.837                     Prob > chi2       =     0.0006
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.059386**	**.1342875**	**0.46**	**0.649**	**.8263352**	**1.358164**
2	**1.001371**	**.1291303**	**0.01**	**0.992**	**.7777318**	**1.28932**
1.IMIDO	**1.462474**	**.1500249**	**3.71**	**0.000**	**1.196106**	**1.788163**
DOSCC	**1.099267**	**.0491942**	**2.11**	**0.034**	**1.006955**	**1.20004**
_cons	**.0774261**	**.0300822**	**-6.58**	**0.000**	**.0361553**	**.1658069**
FARMID						
var(_cons)	**.6759702**	**.384812**			**.2214935**	**2.062976**

```
      FARMID>CowID |
         var(_cons) |   .7725109   .1498084                      .5282461    1.129726
--------------------+------------------------------------------------------------------

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 254.93              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

122 . *Changed by <10%. PrevCM stays out
123 .
124 . *Step 4g: DOSCC
125 . meglm IMIPC i.Tx i.IMIDO || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -2017.9657
Iteration 1:   log likelihood =  -2015.129
Iteration 2:   log likelihood = -2015.1271
Iteration 3:   log likelihood = -2015.1271

Refining starting values:

Grid node 0:   log likelihood = -1884.5227

Fitting full model:

Iteration 0:   log likelihood = -1884.5227
Iteration 1:   log likelihood = -1883.4111
Iteration 2:   log likelihood = -1881.4923
Iteration 3:   log likelihood = -1880.1253
Iteration 4:   log likelihood = -1880.0701
Iteration 5:   log likelihood =  -1880.069
Iteration 6:   log likelihood =  -1880.069

Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit

------------------------------------------------------------------------------
                |     No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+-------------------------------------------------------------
        FARMID |          7        156      542.0      1,242
         CowID |      1,078          1        3.5          4
------------------------------------------------------------------------------

Integration method: mvaghermite                 Integration pts.  =          7
```

				Wald chi2(3)	=	15.12
Log likelihood = -1880.069				Prob > chi2	=	0.0017

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.044838	.1326597	0.35	0.730	.8146571	1.340057
2	.994684	.1286252	-0.04	0.967	.7719942	1.281611
1.IMIDO	1.485706	.1522237	3.86	0.000	1.215401	1.816126
_cons	.1170025	.0395811	-6.34	0.000	.0602893	.2270651
FARMID						
var(_cons)	.6990755	.3968672			.2297706	2.126932
FARMID>CowID						
var(_cons)	.787457	.151022			.540729	1.146764

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 270.12 Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

```
126 . *Changed by <10%. DOSCC stays out
127 .
128 . *Step 4h: IMIDO
129 . meglm IMIPC i.Tx || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -2255.3529
Iteration 1:   log likelihood = -2251.3561
Iteration 2:   log likelihood = -2251.3524
Iteration 3:   log likelihood = -2251.3524

Refining starting values:

Grid node 0:   log likelihood = -2107.8746

Fitting full model:

Iteration 0:   log likelihood = -2107.8746
Iteration 1:   log likelihood = -2106.1639
Iteration 2:   log likelihood =   -2104.97
Iteration 3:   log likelihood = -2104.0976
Iteration 4:   log likelihood = -2103.8445
Iteration 5:   log likelihood = -2103.8382
Iteration 6:   log likelihood = -2103.8382
```

```
Mixed-effects GLM                               Number of obs     =      4,173
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**168**	**596.1**	**1,270**
CowID	**1,110**	**1**	**3.8**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.30
Log likelihood = -2103.8382                     Prob > chi2       =     0.8588
```

IMIPC	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.028108**	**.1224685**	**0.23**	**0.816**	**.8140355**	**1.298477**
2	**.9624265**	**.117121**	**-0.31**	**0.753**	**.7581968**	**1.221668**
_cons	**.1369277**	**.0470221**	**-5.79**	**0.000**	**.0698525**	**.2684112**
FARMID						
var(_cons)	**.7402117**	**.4188413**			**.2441811**	**2.243881**
FARMID>CowID						
var(_cons)	**.7458774**	**.1363842**			**.5212242**	**1.067358**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 295.03              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

130 . *Changed by <10%. IMIDO stays out
131 .
132 . *Report final model
133 . meglm IMIPC i.Tx || FARMID: || CowID:, family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -2255.3529
Iteration 1:   log likelihood = -2251.3561
Iteration 2:   log likelihood = -2251.3524
Iteration 3:   log likelihood = -2251.3524
```

```
Refining starting values:

Grid node 0:   log likelihood = -2107.8746

Fitting full model:

Iteration 0:   log likelihood = -2107.8746
Iteration 1:   log likelihood = -2106.1639
Iteration 2:   log likelihood =   -2104.97
Iteration 3:   log likelihood = -2104.0976
Iteration 4:   log likelihood = -2103.8445
Iteration 5:   log likelihood = -2103.8382
Iteration 6:   log likelihood = -2103.8382

Mixed-effects GLM                               Number of obs     =      4,173
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**168**	**596.1**	**1,270**
CowID	**1,110**	**1**	**3.8**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.30
Log likelihood = -2103.8382                     Prob > chi2       =     0.8588
```

IMIPC	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	.0277202	.1191203	0.23	0.816	-.2057513	.2611917
2	-.0382976	.1216934	-0.31	0.753	-.2768123	.2002172
_cons	-1.988302	.3434079	-5.79	0.000	-2.661369	-1.315235
FARMID						
var(_cons)	.7402117	.4188413			.2441811	2.243881
FARMID>CowID						
var(_cons)	.7458774	.1363842			.5212242	1.067358

```
LR test vs. logistic model: chi2(2) = 295.03                Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.
```

```
134 . margins Tx

    Adjusted predictions                            Number of obs     =      4,173
    Model VCE    : OIM

    Expression   : Marginal predicted mean, predict()
```

	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
0	.1715523	.0413514	4.15	0.000	.090505	.2525996
1	.1748378	.0418245	4.18	0.000	.0928634	.2568123
2	.1670851	.0406833	4.11	0.000	.0873473	.246823

```
135 . margins, dydx(Tx)

    Conditional marginal effects                    Number of obs     =      4,173
    Model VCE    : OIM

    Expression   : Marginal predicted mean, predict()
    dy/dx w.r.t. : 2.Tx 3.Tx
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	.0032855	.0141263	0.23	0.816	-.0244015	.0309726
2	-.0044672	.0142121	-0.31	0.753	-.0323224	.023388

```
    Note: dy/dx for factor levels is the discrete change from the base level.

136 .
137 . *Report ICC
138 . meglm IMIPC || FARMID: || CowID:, family(binomial) link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -2255.8741
    Iteration 1:   log likelihood =  -2251.865
    Iteration 2:   log likelihood = -2251.8612
    Iteration 3:   log likelihood = -2251.8612

    Refining starting values:
```

```
Grid node 0:   log likelihood = -2107.9919

Fitting full model:

Iteration 0:   log likelihood = -2107.9919
Iteration 1:   log likelihood = -2106.2959
Iteration 2:   log likelihood = -2105.1109
Iteration 3:   log likelihood = -2104.2477
Iteration 4:   log likelihood = -2103.9969
Iteration 5:   log likelihood = -2103.9905
Iteration 6:   log likelihood = -2103.9905

Mixed-effects GLM                               Number of obs     =      4,173
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**168**	**596.1**	**1,270**
CowID	**1,110**	**1**	**3.8**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(0)      =          .
Log likelihood = -2103.9905                     Prob > chi2       =          .
```

IMIPC	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	**-1.991534**	**.3364834**	**-5.92**	**0.000**	**-2.651029**	**-1.332038**
FARMID						
var(_cons)	**.7414414**	**.4195001**			**.2446107**	**2.247388**
FARMID>CowID						
var(_cons)	**.7465621**	**.1363831**			**.5218758**	**1.067984**

```
LR test vs. logistic model: chi2(2) = 295.74              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

139 . estat icc

Intraclass correlation
```

Level	ICC	Std. Err.	[95% Conf.	Interval]

FARMID	.1551824	.0740752	.057219	.3573024
CowID|FARMID	.3114365	.0645448	.2004738	.4493027

```
140 .
141 .
142 . *Outcome 3: New IMI
143 . *Step 2: Full model with possible covariates
144 . meglm NewIMI i.Tx Parity DOMY DOSCC PrevCM IMIDO DODIM PCSampDIM|| FARMID: || CowID:
    > (logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1861.6904
    Iteration 1:   log likelihood = -1858.6785
    Iteration 2:   log likelihood = -1858.6761
    Iteration 3:   log likelihood = -1858.6761

    Refining starting values:

    Grid node 0:   log likelihood = -1792.7867

    Fitting full model:

    Iteration 0:   log likelihood = -1792.7867  (not concave)
    Iteration 1:   log likelihood = -1788.5687
    Iteration 2:   log likelihood = -1786.8649
    Iteration 3:   log likelihood = -1781.6151
    Iteration 4:   log likelihood = -1780.2114
    Iteration 5:   log likelihood = -1780.1959
    Iteration 6:   log likelihood = -1780.1959

    Mixed-effects GLM                               Number of obs     =      3,778
    Family:                  binomial
    Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	7	156	539.7	1,242
CowID	1,073	1	3.5	4

```
    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(9)      =      22.75
    Log likelihood = -1780.1959                     Prob > chi2       =     0.0068
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.067021	.1320534	0.52	0.600	.8371998	1.359931
2	1.012385	.1274815	0.10	0.922	.790971	1.295778
Parity	1.146605	.0749428	2.09	0.036	1.008739	1.303313
DOMY	1.0017	.0072205	0.24	0.814	.9876471	1.015952
DOSCC	1.056289	.0518521	1.12	0.265	.9593963	1.162966
PrevCM	1.13313	.1644456	0.86	0.389	.852607	1.505949
IMIDO	.75524	.0825663	-2.57	0.010	.6095758	.935712
DODIM	1.001827	.0011273	1.62	0.105	.9996199	1.004039
PCSampDIM	1.047238	.0237995	2.03	0.042	1.001616	1.094939
_cons	.0275763	.0172592	-5.74	0.000	.0080871	.0940326
FARMID						
var(_cons)	.5800246	.3402997			.1836739	1.831662
FARMID>CowID						
var(_cons)	.5678001	.1358789			.3552192	.9075998

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **156.96** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
145 .
146 . *Step 3: Check for effect measure modification
147 . *I will investigate: Tx:FARM Tx:Parity Tx:IMIDO
148 .
149 . *Tx:FARMD
150 . meglm NewIMI i.Tx##i.FARMID Parity DOMY DOSCC PrevCM IMIDO DODIM PCSampDIM || CowID:
    > (logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1788.6826
    Iteration 1:   log likelihood = -1771.7626
    Iteration 2:   log likelihood = -1770.9436
    Iteration 3:   log likelihood =   -1770.93
    Iteration 4:   log likelihood =   -1770.93

    Refining starting values:

    Grid node 0:   log likelihood =  -1773.557

    Fitting full model:
```

```
Iteration 0:   log likelihood =  -1773.557
Iteration 1:   log likelihood = -1761.6884
Iteration 2:   log likelihood = -1759.0793
Iteration 3:   log likelihood = -1759.0549
Iteration 4:   log likelihood = -1759.0549

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
Group variable:             CowID               Number of groups  =      1,020

                                                Obs per group:
                                                              min =          1
                                                              avg =        3.7
                                                              max =         14

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(27)     =     167.25
Log likelihood = -1759.0549                     Prob > chi2       =     0.0000
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.835406	1.120958	0.99	0.320	.554457	6.075698
2	.6735357	.515268	-0.52	0.605	.1503747	3.0168
FARMID						
2	.3485607	.3005266	-1.22	0.222	.0643248	1.888767
3	4.563922	2.391028	2.90	0.004	1.634541	12.74327
4	9.977812	4.832916	4.75	0.000	3.861375	25.78272
5	4.310915	2.129946	2.96	0.003	1.636839	11.35358
6	2.301965	1.603881	1.20	0.231	.587528	9.019215
7	1.920534	1.07953	1.16	0.246	.6382088	5.779383
Tx#FARMID						
1#2	1.704183	1.832247	0.50	0.620	.2071808	14.0179
1#3	.444524	.304844	-1.18	0.237	.1159208	1.704625
1#4	.4113516	.2627111	-1.39	0.164	.1176496	1.438255
1#5	.9443073	.6175043	-0.09	0.930	.2621157	3.401995
1#6	.5510212	.5178955	-0.63	0.526	.0873249	3.476948
1#7	.63422	.4931283	-0.59	0.558	.1381659	2.911247
2#2	4.211812	4.843033	1.25	0.211	.4422811	40.10878
2#3	1.742258	1.437172	0.67	0.501	.3459111	8.775271
2#4	1.087214	.8563911	0.11	0.915	.2321823	5.090973
2#5	1.969769	1.581921	0.84	0.399	.4081464	9.506372
2#6	1.102605	1.200846	0.09	0.929	.1304301	9.320996
2#7	2.15501	1.913196	0.86	0.387	.3782348	12.27827

Parity	1.159285	.0748337	2.29	0.022	1.021513	1.315639
DOMY	1.001043	.0071295	0.15	0.884	.9871663	1.015114
DOSCC	1.053274	.0507829	1.08	0.282	.9582992	1.157661
PrevCM	1.096585	.1565668	0.65	0.518	.8289157	1.450688
IMIDO	.746838	.0811995	-2.68	0.007	.6035038	.9242146
DODIM	1.001846	.0011129	1.66	0.097	.9996671	1.004029
PCSampDIM	1.041161	.0231728	1.81	0.070	.9967194	1.087584
_cons	.0113961	.0079917	-6.38	0.000	.002883	.045048
CowID						
var(_cons)	.4948639	.1294907			.2963142	.8264548

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chibar2(01) = **23.75** Prob >= chibar2 = **0.0000**

```
151 . testparm Tx#FARMID

 ( 1)  [NewIMI]2.Tx#2.FARMID = 0
 ( 2)  [NewIMI]2.Tx#3.FARMID = 0
 ( 3)  [NewIMI]2.Tx#4.FARMID = 0
 ( 4)  [NewIMI]2.Tx#5.FARMID = 0
 ( 5)  [NewIMI]2.Tx#6.FARMID = 0
 ( 6)  [NewIMI]2.Tx#7.FARMID = 0
 ( 7)  [NewIMI]3.Tx#2.FARMID = 0
 ( 8)  [NewIMI]3.Tx#3.FARMID = 0
 ( 9)  [NewIMI]3.Tx#4.FARMID = 0
 (10)  [NewIMI]3.Tx#5.FARMID = 0
 (11)  [NewIMI]3.Tx#6.FARMID = 0
 (12)  [NewIMI]3.Tx#7.FARMID = 0

           chi2( 12) =   14.89
         Prob > chi2 =    0.2475

152 .
153 . *Tx:Parity
154 . meglm NewIMI i.Tx##Parity DOMY DOSCC PrevCM IMIDO DODIM PCSampDIM|| FARMID: || CowID
    > k(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1852.9035
    Iteration 1:   log likelihood =  -1849.617
    Iteration 2:   log likelihood = -1849.6146
    Iteration 3:   log likelihood = -1849.6146

    Refining starting values:
```

```
Grid node 0:   log likelihood = -1787.0653

Fitting full model:

Iteration 0:   log likelihood = -1787.0653  (not concave)
Iteration 1:   log likelihood = -1782.8271
Iteration 2:   log likelihood = -1781.6471
Iteration 3:   log likelihood = -1774.3269
Iteration 4:   log likelihood = -1773.3731
Iteration 5:   log likelihood = -1773.3599
Iteration 6:   log likelihood = -1773.3598

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	7	156	539.7	1,242
CowID	1,073	1	3.5	4

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(14)     =      36.60
Log likelihood = -1773.3598                     Prob > chi2       =     0.0008
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	.9976673	.1867289	-0.01	0.990	.6913057	1.439797
2	.9143309	.1786533	-0.46	0.647	.6234263	1.340978
Parity						
2	1.334815	.2782983	1.39	0.166	.8870581	2.008583
3	.8965647	.2056382	-0.48	0.634	.5719368	1.40545
Tx#Parity						
1#2	.953522	.2762496	-0.16	0.870	.5404118	1.682428
1#3	1.409618	.4292396	1.13	0.260	.7760754	2.560347
2#2	.6961658	.2065276	-1.22	0.222	.3892167	1.245185
2#3	2.247515	.7002916	2.60	0.009	1.220341	4.139273
DOMY	1.001291	.0071464	0.18	0.857	.9873821	1.015396
DOSCC	1.050112	.0514067	1.00	0.318	.9540389	1.155859
PrevCM	1.121525	.1614148	0.80	0.426	.845863	1.487022
IMIDO	.7609235	.0829293	-2.51	0.012	.614572	.9421265

DODIM	1.001637	.0011201	1.46	0.143	.9994445	1.003835
PCSampDIM	1.049288	.0236552	2.13	0.033	1.003934	1.096691
_cons	.0371982	.0230868	-5.30	0.000	.0110212	.125549
FARMID						
var(_cons)	.5619739	.3297342			.1779425	1.774813
FARMID>CowID						
var(_cons)	.5203301	.132726			.3156124	.8578349

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **152.51** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
155 . testparm Tx#Parity

 ( 1)  [NewIMI]2.Tx#2.Parity = 0
 ( 2)  [NewIMI]2.Tx#3.Parity = 0
 ( 3)  [NewIMI]3.Tx#2.Parity = 0
 ( 4)  [NewIMI]3.Tx#3.Parity = 0

           chi2(  4) =   13.64
         Prob > chi2 =    0.0086

156 .
157 . *P<0.05. Will investigate further.
158 . margins Tx#Parity
```

Predictive margins Number of obs = **3,778**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**

	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx#Parity						
0#1	.1401822	.0349876	4.01	0.000	.0716077	.2087567
0#2	.1732482	.0408119	4.25	0.000	.0932583	.253238
0#3	.1290123	.034408	3.75	0.000	.0615738	.1964507
1#1	.1399357	.0341671	4.10	0.000	.0729694	.2069021
1#2	.1671599	.0407446	4.10	0.000	.087302	.2470179
1#3	.166311	.0407065	4.09	0.000	.0865278	.2460942
2#1	.130967	.033026	3.97	0.000	.0662373	.1956968
2#2	.1237738	.032809	3.77	0.000	.0594694	.1880782
2#3	.2163237	.0485528	4.46	0.000	.121162	.3114853

```
159 .
160 . *Similar pattern to last model, with 3rd and greater parity cows in the algorithm gr
    >  other gropus (21% new IMI risk, compared 13% in other parities in algorithm group).
    >  unnecessary complication to report stratified models in this situation, given that
    >  risk in that group is very wide (12-31%).
161 .
162 . *Tx:IMIDO
163 . meglm NewIMI i.Tx##i.IMIDO i.Parity DOMY DOSCC PrevCM DODIM PCSampDIM|| FARMID: || C
    >  link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1860.8614
    Iteration 1:   log likelihood = -1857.7827
    Iteration 2:   log likelihood = -1857.7802
    Iteration 3:   log likelihood = -1857.7802

    Refining starting values:

    Grid node 0:   log likelihood =  -1792.378

    Fitting full model:

    Iteration 0:   log likelihood =  -1792.378  (not concave)
    Iteration 1:   log likelihood = -1788.1618
    Iteration 2:   log likelihood = -1786.4059
    Iteration 3:   log likelihood = -1781.1496
    Iteration 4:   log likelihood = -1779.6714
    Iteration 5:   log likelihood = -1779.6553
    Iteration 6:   log likelihood = -1779.6553

    Mixed-effects GLM                               Number of obs     =      3,778
    Family:                  binomial
    Link:                       logit

    ------------------------------------------------------------------------------
                    |     No. of       Observations per Group
     Group Variable |     Groups    Minimum    Average    Maximum
    ----------------+-------------------------------------------------------------
            FARMID |          7        156      539.7      1,242
            CowID |      1,073          1        3.5          4
    ------------------------------------------------------------------------------

    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(12)     =      23.76
    Log likelihood = -1779.6553                     Prob > chi2       =     0.0219
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	1.112747	.1559613	0.76	0.446	.8454601	1.464536
2	1.082339	.1534713	0.56	0.577	.8197217	1.429092
1.IMIDO	.8691404	.1613305	-0.76	0.450	.6040728	1.25052
Tx#IMIDO						
1#1	.8537209	.2189073	-0.62	0.537	.5164813	1.411163
2#1	.7644974	.2026174	-1.01	0.311	.4547567	1.285206
Parity						
2	1.170315	.1452765	1.27	0.205	.9175702	1.492679
3	1.310411	.172048	2.06	0.039	1.013096	1.69498
DOMY	1.00169	.0072078	0.23	0.814	.9876626	1.015917
DOSCC	1.05675	.0519908	1.12	0.262	.9596091	1.163725
PrevCM	1.126278	.1634314	0.82	0.412	.8474808	1.496792
DODIM	1.001846	.0011265	1.64	0.101	.9996407	1.004057
PCSampDIM	1.047205	.023781	2.03	0.042	1.001617	1.094868
_cons	.0303745	.0189153	-5.61	0.000	.0089626	.1029394
FARMID						
var(_cons)	.5776476	.338999			.182863	1.824737
FARMID>CowID						
var(_cons)	.5627969	.1355316			.3510485	.9022697

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **156.25** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
164 . testparm Tx#IMIDO

 ( 1)  [NewIMI]2.Tx#1.IMIDO = 0
 ( 2)  [NewIMI]3.Tx#1.IMIDO = 0

           chi2(  2) =    1.04
         Prob > chi2 =    0.5934

165 .
166 . *Step 4: remove unnecessary covariates using 10% rule. I will remove in the followin
    >  DOSCC PCSampDIM PrevCM IMIDO
167 .
168 . *Step 4a: Full model
```

```
169 . meglm NewIMI i.Tx i.IMIDO i.Parity DOMY DOSCC PrevCM DODIM PCSampDIM|| FARMID: || Co
    > link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1861.6725
    Iteration 1:   log likelihood = -1858.6621
    Iteration 2:   log likelihood = -1858.6597
    Iteration 3:   log likelihood = -1858.6597

    Refining starting values:

    Grid node 0:   log likelihood = -1792.8234

    Fitting full model:

    Iteration 0:   log likelihood = -1792.8234  (not concave)
    Iteration 1:   log likelihood = -1788.6041
    Iteration 2:   log likelihood = -1786.8988
    Iteration 3:   log likelihood =  -1781.626
    Iteration 4:   log likelihood = -1780.1935
    Iteration 5:   log likelihood = -1780.1767
    Iteration 6:   log likelihood = -1780.1766

    Mixed-effects GLM                               Number of obs     =      3,778
    Family:                  binomial
    Link:                       logit

    ------------------------------------------------------------------------------
                 |     No. of       Observations per Group
     Group Variable |    Groups    Minimum    Average    Maximum
    ---------------+--------------------------------------------------------------
                 FARMID |         7        156      539.7      1,242
                 CowID |     1,073          1        3.5          4
    ------------------------------------------------------------------------------

    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(10)     =      22.78
    Log likelihood = -1780.1766                     Prob > chi2       =     0.0116
    ------------------------------------------------------------------------------
          NewIMI | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
    -------------+----------------------------------------------------------------
              Tx |
               1 |    1.06856   .1324597     0.53   0.593     .8380758    1.362432
               2 |   1.012813   .1275305     0.10   0.919      .791313    1.296313

         1.IMIDO |    .7548885   .0825396    -2.57   0.010     .6092735    .9353052
    ------------------------------------------------------------------------------
```

Parity						
2	**1.170651**	**.1454678**	**1.27**	**0.205**	**.9176041**	**1.493481**
3	**1.311418**	**.1723582**	**2.06**	**0.039**	**1.013605**	**1.696733**
DOMY	**1.001685**	**.0072193**	**0.23**	**0.815**	**.9876347**	**1.015935**
DOSCC	**1.055508**	**.0519578**	**1.10**	**0.272**	**.958431**	**1.162418**
PrevCM	**1.133756**	**.1645199**	**0.87**	**0.387**	**.8531026**	**1.506738**
DODIM	**1.001825**	**.0011272**	**1.62**	**0.105**	**.999618**	**1.004037**
PCSampDIM	**1.047391**	**.0238081**	**2.04**	**0.042**	**1.001752**	**1.095109**
_cons	**.0315214**	**.0196066**	**-5.56**	**0.000**	**.0093143**	**.1066742**
FARMID						
var(_cons)	**.5793346**	**.3398983**			**.1834533**	**1.829504**
FARMID>CowID						
var(_cons)	**.5670989**	**.1358741**			**.3545807**	**.9069899**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **156.97** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
170 .
171 . *Step 4b: Removed DODIM
172 . meglm NewIMI i.Tx i.IMIDO i.Parity DOMY DOSCC PrevCM PCSampDIM|| FARMID: || CowID:,
> ogit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1862.5797
Iteration 1:   log likelihood = -1859.6375
Iteration 2:   log likelihood = -1859.6352
Iteration 3:   log likelihood = -1859.6352

Refining starting values:

Grid node 0:   log likelihood = -1793.6987

Fitting full model:

Iteration 0:   log likelihood = -1793.6987  (not concave)
Iteration 1:   log likelihood = -1789.4788
Iteration 2:   log likelihood = -1787.7998
Iteration 3:   log likelihood = -1782.6825
Iteration 4:   log likelihood = -1781.4844
Iteration 5:   log likelihood =  -1781.475
Iteration 6:   log likelihood =  -1781.475
```

Mixed-effects GLM — Number of obs = **3,778**
Family: **binomial**
Link: **logit**

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

Integration method: **mvaghermite** — Integration pts. = **7**

Wald chi2(**9**) = **20.20**
Log likelihood = **-1781.475** — Prob > chi2 = **0.0167**

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.080621**	**.1341344**	**0.62**	**0.532**	**.847259**	**1.378258**
2	**1.019324**	**.1285538**	**0.15**	**0.879**	**.7960886**	**1.305158**
1.IMIDO	**.7542522**	**.082511**	**-2.58**	**0.010**	**.6086952**	**.9346162**
Parity						
2	**1.169168**	**.1456174**	**1.25**	**0.210**	**.9159281**	**1.492424**
3	**1.304125**	**.1717384**	**2.02**	**0.044**	**1.007455**	**1.688157**
DOMY	**.9995802**	**.0071005**	**-0.06**	**0.953**	**.9857599**	**1.013594**
DOSCC	**1.056331**	**.0520548**	**1.11**	**0.266**	**.9590782**	**1.163447**
PrevCM	**1.159**	**.1679974**	**1.02**	**0.309**	**.8723715**	**1.539804**
PCSampDIM	**1.046796**	**.0238609**	**2.01**	**0.045**	**1.001059**	**1.094623**
_cons	**.0589433**	**.0283868**	**-5.88**	**0.000**	**.022935**	**.1514849**
FARMID						
var(_cons)	**.5640013**	**.3314323**			**.1782692**	**1.784366**
FARMID>CowID						
var(_cons)	**.5768512**	**.1366667**			**.3625755**	**.9177602**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **156.32** — Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
173 . *Changed by <10%. DODIM stays out
174 .
```

```
175 . *Step 4c: Removed DOMY
176 . meglm NewIMI i.Tx i.IMIDO i.Parity DOSCC PrevCM PCSampDIM|| FARMID: || CowID:, or fa

    Fitting fixed-effects model:

    Iteration 0:   log likelihood =  -1863.411
    Iteration 1:   log likelihood = -1860.5129
    Iteration 2:   log likelihood = -1860.5105
    Iteration 3:   log likelihood = -1860.5105

    Refining starting values:

    Grid node 0:   log likelihood = -1793.4569

    Fitting full model:

    Iteration 0:   log likelihood = -1793.4569  (not concave)
    Iteration 1:   log likelihood = -1789.2499
    Iteration 2:   log likelihood = -1788.2965
    Iteration 3:   log likelihood = -1784.6423
    Iteration 4:   log likelihood = -1781.6453
    Iteration 5:   log likelihood = -1781.4771
    Iteration 6:   log likelihood = -1781.4767
    Iteration 7:   log likelihood = -1781.4767

    Mixed-effects GLM                               Number of obs     =      3,778
    Family:                  binomial
    Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

```
    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(8)      =      20.19
    Log likelihood = -1781.4767                     Prob > chi2       =     0.0096
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.080339**	**.1340172**	**0.62**	**0.533**	**.8471637**	**1.377693**
2	**1.019161**	**.1285064**	**0.15**	**0.880**	**.7960021**	**1.304881**
1.IMIDO	**.7540274**	**.0823994**	**-2.58**	**0.010**	**.6086514**	**.9341264**

Parity						
2	**1.169183**	**.145624**	**1.25**	**0.210**	**.915933**	**1.492455**
3	**1.304316**	**.1717385**	**2.02**	**0.044**	**1.00764**	**1.68834**
DOSCC	**1.05743**	**.0486781**	**1.21**	**0.225**	**.9662004**	**1.157274**
PrevCM	**1.158337**	**.167532**	**1.02**	**0.309**	**.8724173**	**1.537961**
PCSampDIM	**1.04686**	**.0238379**	**2.01**	**0.044**	**1.001166**	**1.09464**
_cons	**.0580389**	**.0234705**	**-7.04**	**0.000**	**.0262725**	**.1282148**
FARMID						
var(_cons)	**.5635068**	**.3310508**			**.1781692**	**1.782239**
FARMID>CowID						
var(_cons)	**.5769498**	**.1366686**			**.362664**	**.91785**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **158.07** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
177 . *Changed by <10%. DOMY stays out
178 .
179 . *Step 4d: Removed Parity
180 . meglm NewIMI i.Tx i.IMIDO DOSCC PrevCM PCSampDIM|| FARMID: || CowID:, or family(bino
```

Fitting fixed-effects model:

Iteration 0: log likelihood = **-1864.4594**
Iteration 1: log likelihood = **-1861.628**
Iteration 2: log likelihood = **-1861.6257**
Iteration 3: log likelihood = **-1861.6257**

Refining starting values:

Grid node 0: log likelihood = **-1794.7534**

Fitting full model:

Iteration 0: log likelihood = **-1794.7534** (not concave)
Iteration 1: log likelihood = **-1790.5609**
Iteration 2: log likelihood = **-1788.999**
Iteration 3: log likelihood = **-1784.343**
Iteration 4: log likelihood = **-1783.5845**
Iteration 5: log likelihood = **-1783.5819**
Iteration 6: log likelihood = **-1783.5819**

Mixed-effects GLM Number of obs = **3,778**

```
Family:                binomial
Link:                     logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(6)      =      16.02
Log likelihood = -1783.5819                     Prob > chi2       =     0.0137
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.070017**	**.1331255**	**0.54**	**0.586**	**.8384728**	**1.365502**
2	**1.012496**	**.1282758**	**0.10**	**0.922**	**.7898645**	**1.29788**
1.IMIDO	**.7537521**	**.0824516**	**-2.58**	**0.010**	**.608299**	**.9339852**
DOSCC	**1.085536**	**.0481186**	**1.85**	**0.064**	**.9952061**	**1.184065**
PrevCM	**1.203671**	**.1736717**	**1.28**	**0.199**	**.907177**	**1.597068**
PCSampDIM	**1.04518**	**.0239028**	**1.93**	**0.053**	**.9993656**	**1.093094**
_cons	**.0563869**	**.0227147**	**-7.14**	**0.000**	**.0256025**	**.124186**
FARMID						
var(_cons)	**.5542098**	**.3263943**			**.1747313**	**1.757833**
FARMID>CowID						
var(_cons)	**.5987475**	**.1381081**			**.3809817**	**.9409863**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 156.09              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

181 . *Changed by <10%. Parity stays out
182 .
183 . *Step 4e: Removed DOSCC
184 . meglm NewIMI i.Tx i.IMIDO PrevCM PCSampDIM|| FARMID: || CowID:, or family(binomial)

Fitting fixed-effects model:

Iteration 0:   log likelihood =  -1871.002
Iteration 1:   log likelihood = -1868.4634
```

```
Iteration 2:   log likelihood = -1868.4612
Iteration 3:   log likelihood = -1868.4612

Refining starting values:

Grid node 0:   log likelihood = -1795.8335

Fitting full model:

Iteration 0:   log likelihood = -1795.8335  (not concave)
Iteration 1:   log likelihood = -1791.6748
Iteration 2:   log likelihood = -1790.2424
Iteration 3:   log likelihood = -1785.9546
Iteration 4:   log likelihood = -1785.3009
Iteration 5:   log likelihood = -1785.2913
Iteration 6:   log likelihood = -1785.2913

Mixed-effects GLM                               Number of obs     =      3,778
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**539.7**	**1,242**
CowID	**1,073**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(5)      =      12.64
Log likelihood = -1785.2913                     Prob > chi2       =     0.0270
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.058321**	**.1318892**	**0.45**	**0.649**	**.8289713**	**1.351123**
2	**1.00742**	**.1279801**	**0.06**	**0.954**	**.7853733**	**1.292246**
1.IMIDO	**.7634746**	**.0834353**	**-2.47**	**0.014**	**.6162716**	**.9458386**
PrevCM	**1.261812**	**.1797879**	**1.63**	**0.103**	**.9543599**	**1.668312**
PCSampDIM	**1.04567**	**.0239614**	**1.95**	**0.051**	**.9997456**	**1.093704**
_cons	**.0762428**	**.0281896**	**-6.96**	**0.000**	**.0369385**	**.1573684**
FARMID						
var(_cons)	**.5704959**	**.3346868**			**.1806705**	**1.801432**
FARMID>CowID						

```
   var(_cons)|   .6115098   .1391301                      .3915064    .9551419
-------------------------------------------------------------------------------

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 166.34              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

185 . *Changed by <10%. DOSCC stays out
186 .
187 . *Step 4f: Removed PCSampDIM
188 . meglm NewIMI i.Tx i.IMIDO PrevCM || FARMID: || CowID:, or family(binomial) link(logi

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1903.2371
Iteration 1:   log likelihood = -1901.5457
Iteration 2:   log likelihood = -1901.5446
Iteration 3:   log likelihood = -1901.5446

Refining starting values:

Grid node 0:   log likelihood = -1797.1515

Fitting full model:

Iteration 0:   log likelihood = -1797.1515
Iteration 1:   log likelihood =  -1795.411
Iteration 2:   log likelihood = -1791.7292
Iteration 3:   log likelihood =  -1789.064
Iteration 4:   log likelihood = -1788.8922
Iteration 5:   log likelihood =  -1788.891
Iteration 6:   log likelihood =  -1788.891

Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit

------------------------------------------------------------------------------
                |     No. of       Observations per Group
 Group Variable |     Groups    Minimum    Average    Maximum
----------------+-------------------------------------------------------------
         FARMID |          7        156      542.0      1,242
          CowID |      1,078          1        3.5          4
------------------------------------------------------------------------------

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(4)      =       8.94
```

Log likelihood = **-1788.891** Prob > chi2 = **0.0626**

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.048441**	**.1304032**	**0.38**	**0.704**	**.8216235**	**1.337873**
2	**1.006695**	**.1277623**	**0.05**	**0.958**	**.7850001**	**1.291**
1.IMIDO	**.7582053**	**.0828033**	**-2.53**	**0.011**	**.612107**	**.9391744**
PrevCM	**1.266543**	**.1804773**	**1.66**	**0.097**	**.9579149**	**1.674606**
_cons	**.0938639**	**.0352136**	**-6.31**	**0.000**	**.0449951**	**.1958085**
FARMID						
var(_cons)	**.699638**	**.3995406**			**.228444**	**2.142728**
FARMID>CowID						
var(_cons)	**.6124416**	**.1393736**			**.3920635**	**.9566938**

Note: Estimates are transformed only in the first equation.
Note: **_cons** estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(**2**) = **225.31** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
189 . *Changed by <10%. PCSampDIM stays out
190 .
191 . *Step 4g: Removed PrevCM
192 . meglm NewIMI i.Tx i.IMIDO || FARMID: || CowID:, or family(binomial) link(logit)

Fitting fixed-effects model:

Iteration 0:   log likelihood = -1906.9318
Iteration 1:   log likelihood = -1905.2447
Iteration 2:   log likelihood = -1905.2437
Iteration 3:   log likelihood = -1905.2437

Refining starting values:

Grid node 0:   log likelihood = -1798.4938

Fitting full model:

Iteration 0:   log likelihood = -1798.4938
Iteration 1:   log likelihood = -1795.2981
Iteration 2:   log likelihood = -1791.1013
Iteration 3:   log likelihood = -1790.2708
Iteration 4:   log likelihood = -1790.2522
Iteration 5:   log likelihood = -1790.2521
```

```
Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**542.0**	**1,242**
CowID	**1,078**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(3)      =       6.24
Log likelihood = -1790.2521                     Prob > chi2       =     0.1005
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.04531**	**.1300553**	**0.36**	**0.722**	**.819106**	**1.333981**
2	**1.000218**	**.1269186**	**0.00**	**0.999**	**.7799827**	**1.282639**
1.IMIDO	**.7642851**	**.0833703**	**-2.46**	**0.014**	**.6171689**	**.9464698**
_cons	**.1223913**	**.0416856**	**-6.17**	**0.000**	**.0627823**	**.2385965**
FARMID						
var(_cons)	**.7132042**	**.4068127**			**.2331779**	**2.181426**
FARMID>CowID						
var(_cons)	**.6156926**	**.1396327**			**.3947483**	**.9603016**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 229.98              Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

193 . *Changed by <10%. PrevCM stays out
194 .
195 . *Step 4h: Removed IMIDO
196 . meglm NewIMI i.Tx || FARMID: || CowID:, or family(binomial) link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1906.9818
    Iteration 1:   log likelihood = -1905.2958
    Iteration 2:   log likelihood = -1905.2949
    Iteration 3:   log likelihood = -1905.2949
```

```
Refining starting values:

Grid node 0:   log likelihood = -1799.1424

Fitting full model:

Iteration 0:   log likelihood = -1799.1424
Iteration 1:   log likelihood = -1797.7365
Iteration 2:   log likelihood =  -1795.025
Iteration 3:   log likelihood = -1793.5051
Iteration 4:   log likelihood = -1793.3548
Iteration 5:   log likelihood = -1793.3536
Iteration 6:   log likelihood = -1793.3536

Mixed-effects GLM                               Number of obs     =      3,794
Family:                  binomial
Link:                       logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**542.0**	**1,242**
CowID	**1,078**	**1**	**3.5**	**4**

```
Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(2)      =       0.17
Log likelihood = -1793.3536                     Prob > chi2       =     0.9182
```

NewIMI	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**1.046956**	**.1298974**	**0.37**	**0.712**	**.8209531**	**1.335175**
2	**1.003857**	**.1270208**	**0.03**	**0.976**	**.7833705**	**1.286403**
_cons	**.1159121**	**.0385802**	**-6.47**	**0.000**	**.0603692**	**.2225576**
FARMID						
var(_cons)	**.6794512**	**.3882979**			**.2216701**	**2.082617**
FARMID>CowID						
var(_cons)	**.6082918**	**.1386766**			**.3890966**	**.9509692**

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test vs. logistic model: chi2(2) = 223.88              Prob > chi2 = 0.0000
```

```
    Note: LR test is conservative and provided only for reference.

197 .
198 . *Step 5: Report final model
199 . meglm NewIMI i.Tx || FARMID: || CowID:, family(binomial) link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1906.9818
    Iteration 1:   log likelihood = -1905.2958
    Iteration 2:   log likelihood = -1905.2949
    Iteration 3:   log likelihood = -1905.2949

    Refining starting values:

    Grid node 0:   log likelihood = -1799.1424

    Fitting full model:

    Iteration 0:   log likelihood = -1799.1424
    Iteration 1:   log likelihood = -1797.7365
    Iteration 2:   log likelihood =  -1795.025
    Iteration 3:   log likelihood = -1793.5051
    Iteration 4:   log likelihood = -1793.3548
    Iteration 5:   log likelihood = -1793.3536
    Iteration 6:   log likelihood = -1793.3536

    Mixed-effects GLM                               Number of obs     =      3,794
    Family:                binomial
    Link:                     logit
```

Group Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
FARMID	**7**	**156**	**542.0**	**1,242**
CowID	**1,078**	**1**	**3.5**	**4**

```
    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(2)      =       0.17
    Log likelihood = -1793.3536                     Prob > chi2       =     0.9182
```

NewIMI	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	**.0458864**	**.1240715**	**0.37**	**0.712**	**-.1972893**	**.2890622**

2	.0038501	.1265327	0.03	0.976	-.2441495	.2518496
_cons	-2.154923	.3328397	-6.47	0.000	-2.807277	-1.502569
FARMID						
var(_cons)	.6794512	.3882979			.2216701	2.082617
FARMID>CowID						
var(_cons)	.6082918	.1386766			.3890966	.9509692

LR test vs. logistic model: chi2(**2**) = **223.88** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
200 . margins Tx
```

Adjusted predictions Number of obs = **3,794**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**

	Delta-method					
	Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
0	.147021	.0366388	4.01	0.000	.0752102	.2188317
1	.1520168	.0374303	4.06	0.000	.0786548	.2253789
2	.1474354	.0367238	4.01	0.000	.075458	.2194128

```
201 . margins, dydx(Tx)
```

Conditional marginal effects Number of obs = **3,794**
Model VCE : **OIM**

Expression : **Marginal predicted mean, predict()**
dy/dx w.r.t. : **2.Tx 3.Tx**

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Tx						
1	.0049959	.0135311	0.37	0.712	-.0215246	.0315164
2	.0004144	.0136197	0.03	0.976	-.0262798	.0271086

Note: dy/dx for factor levels is the discrete change from the base level.

```
202 .
203 . *Report ICC
204 . meglm NewIMI || FARMID: || CowID:, family(binomial) link(logit)

    Fitting fixed-effects model:

    Iteration 0:   log likelihood = -1907.3926
    Iteration 1:   log likelihood = -1905.7142
    Iteration 2:   log likelihood = -1905.7133
    Iteration 3:   log likelihood = -1905.7133

    Refining starting values:

    Grid node 0:   log likelihood = -1799.2054

    Fitting full model:

    Iteration 0:   log likelihood = -1799.2054
    Iteration 1:   log likelihood = -1797.8075
    Iteration 2:   log likelihood = -1795.1011
    Iteration 3:   log likelihood = -1793.5905
    Iteration 4:   log likelihood = -1793.4401
    Iteration 5:   log likelihood = -1793.4389
    Iteration 6:   log likelihood = -1793.4389

    Mixed-effects GLM                               Number of obs     =      3,794
    Family:                  binomial
    Link:                       logit

    ------------------------------------------------------------------------------
                 |        No. of       Observations per Group
     Group Variable |     Groups    Minimum    Average    Maximum
    ---------------+--------------------------------------------------------------
                 FARMID |          7        156      542.0      1,242
                  CowID |      1,078          1        3.5          4
    ------------------------------------------------------------------------------

    Integration method: mvaghermite                 Integration pts.  =          7

                                                    Wald chi2(0)      =          .
    Log likelihood = -1793.4389                     Prob > chi2       =          .
    ------------------------------------------------------------------------------
          NewIMI |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
    -------------+----------------------------------------------------------------
           _cons |  -2.138052   .3248702    -6.58   0.000    -2.774785   -1.501318
    -------------+----------------------------------------------------------------
    FARMID       |
       var(_cons) |   .6805675   .3888771                      .2220719    2.085686
    ------------------------------------------------------------------------------
```

FARMID>CowID				
var(_cons)	**.607988**	**.1386545**	**.3888432**	**.9506386**

LR test vs. logistic model: chi2(**2**) = **224.55** Prob > chi2 = **0.0000**

Note: LR test is conservative and provided only for reference.

```
205 . estat icc
```

Intraclass correlation

Level	ICC	Std. Err.	[95% Conf.	Interval]
FARMID	**.1486467**	**.0722295**	**.0539665**	**.3482828**
CowID|FARMID	**.2814409**	**.0657981**	**.1715021**	**.4256474**

```
206 .
207 .
    end of do-file

208 . log close
          name:  <unnamed>
           log:  /Users/SamRowe1/Dropbox/R backup/SDCT - R/SDCT QTR LOG.smcl
      log type:  smcl
     closed on:   2 Jul 2019, 12:26:03
```