

Figure S1: Distributions of the measured transgenic and wildtype lignin and wood traits that were used to train the random forest models.

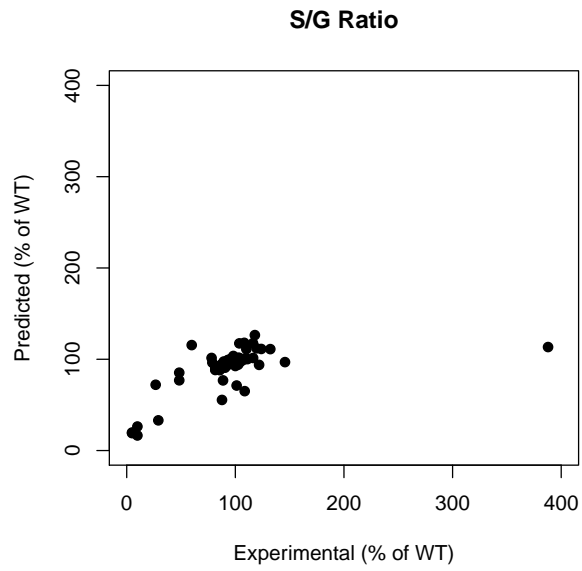


Figure S2: Predicted vs. experimental S/G Ratio.

### *PtrPAL* Family Knockdown

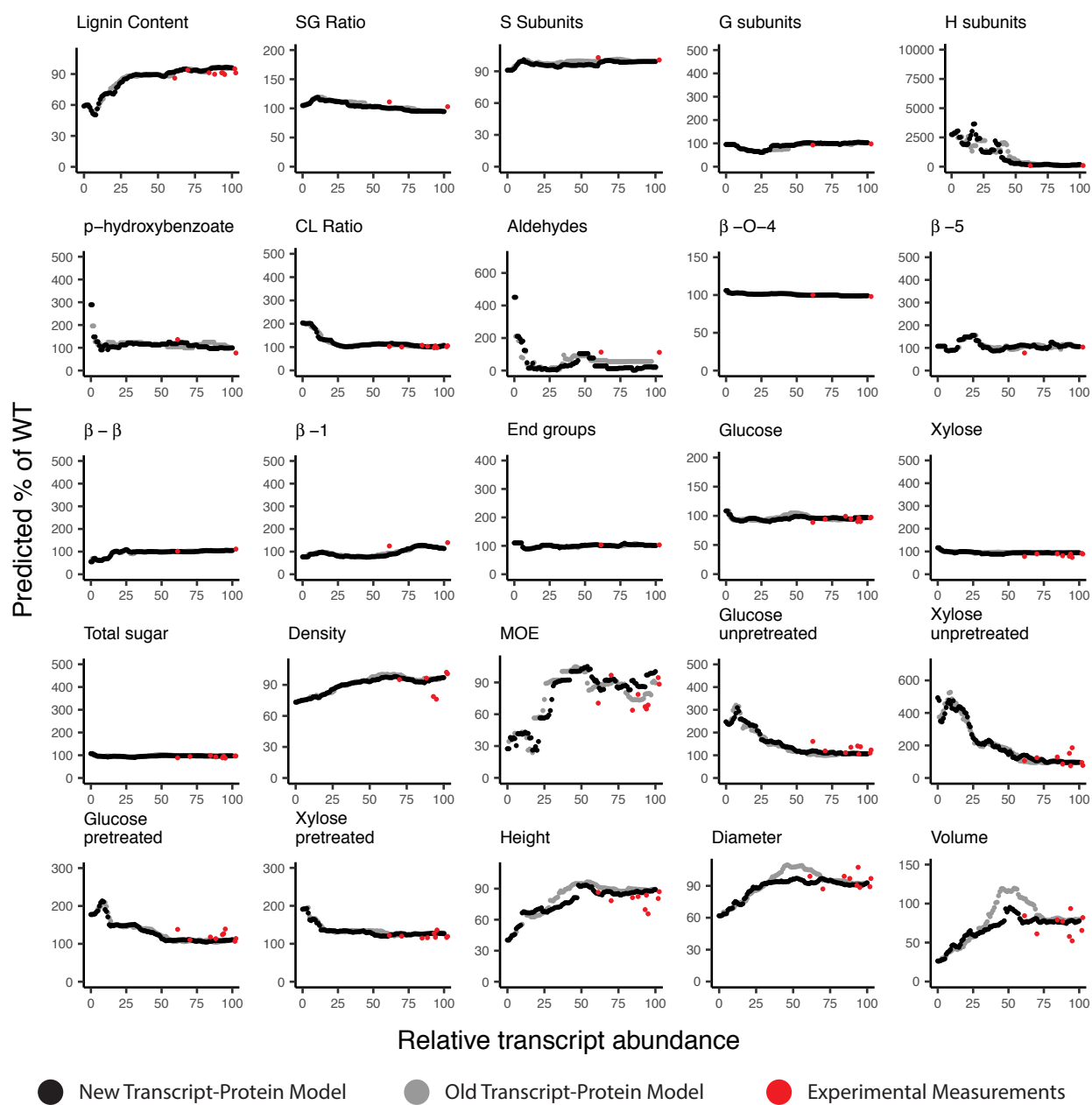


Figure S3: Simulating knockdowns of the *PtrPAL* family.

### *PtrPAL1* Knockdown

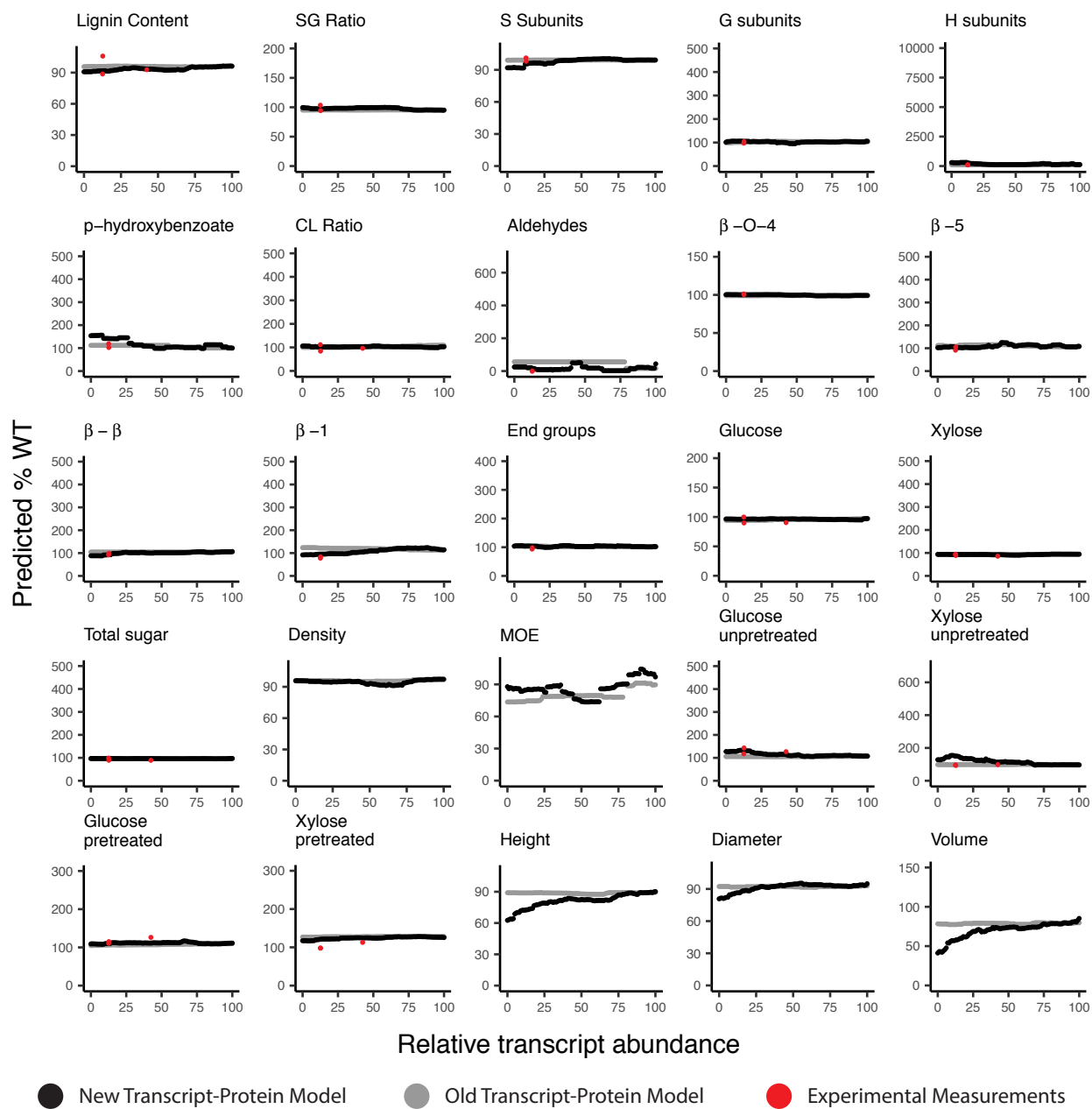


Figure S4: Simulating knockdowns of *PtrPAL1*.

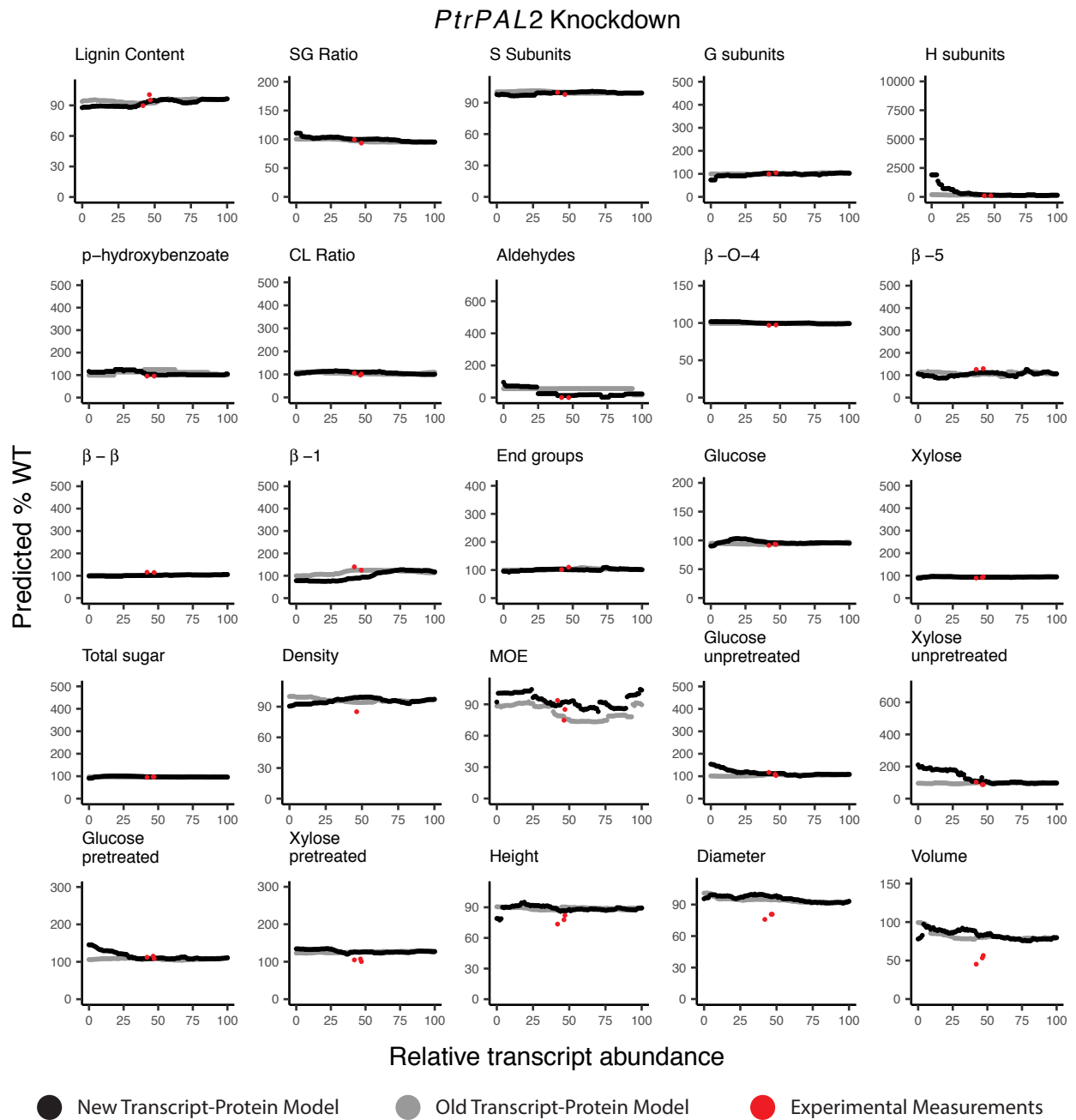


Figure S5: Simulating knockdowns of *PtrPAL2*.

### PtrPAL3 Knockdown

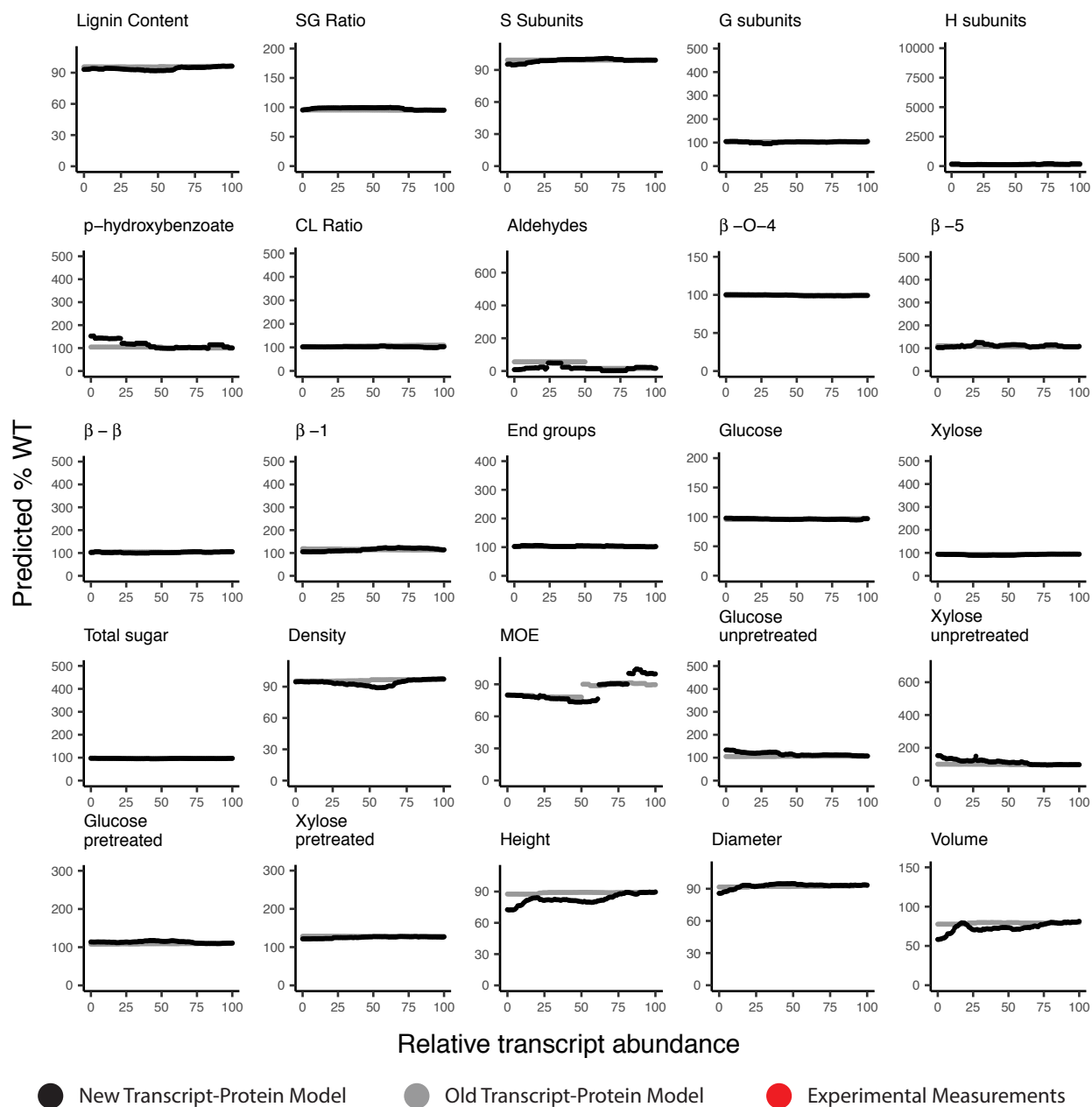


Figure S6: Simulating knockdowns of *PtrPAL3*.

*PtrPAL4/5* Knockdown

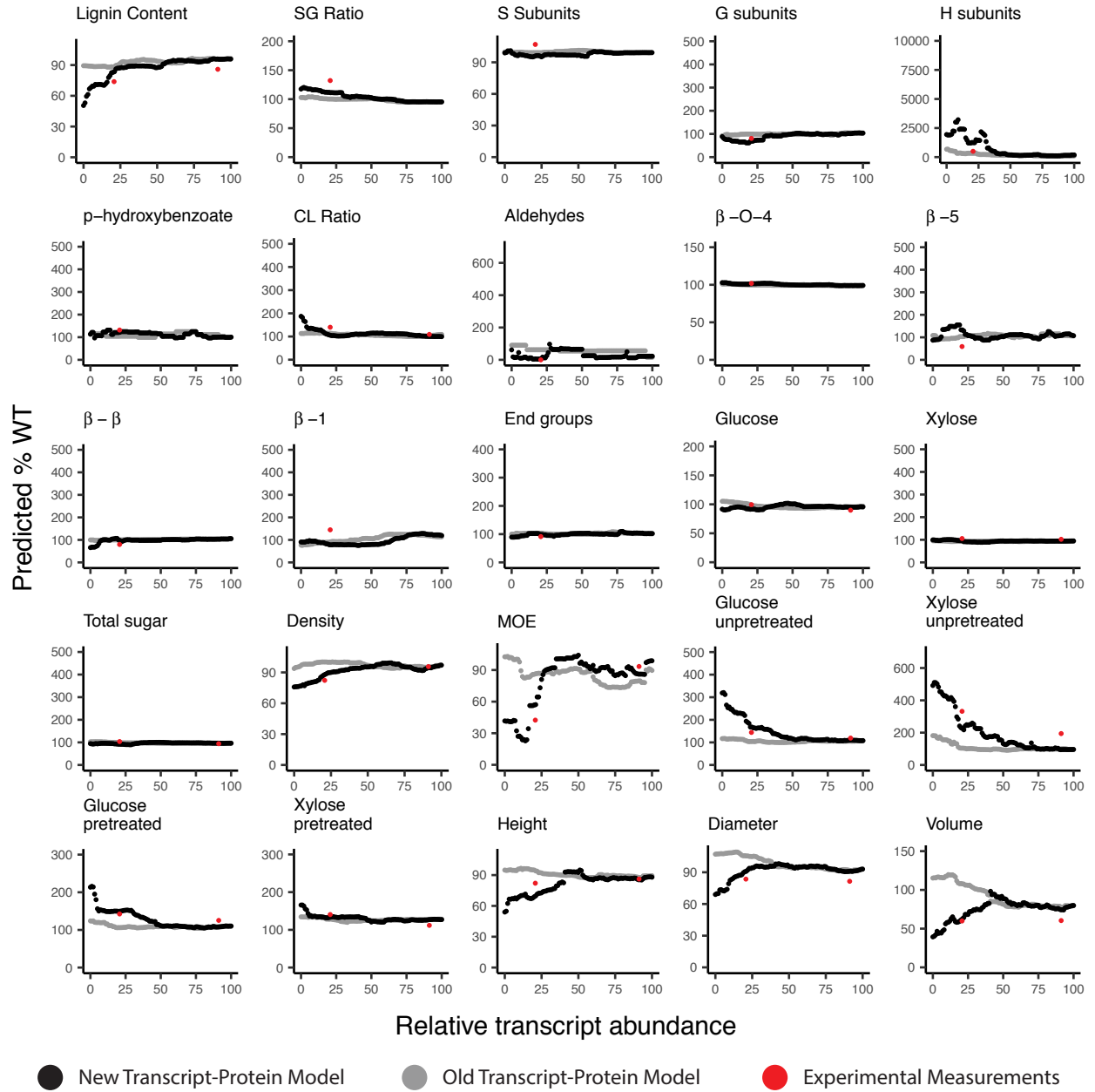


Figure S7: Simulating knockdowns of *PtrPAL4–5* monolignol gene.

### *Ptr4CL* Family Knockdown

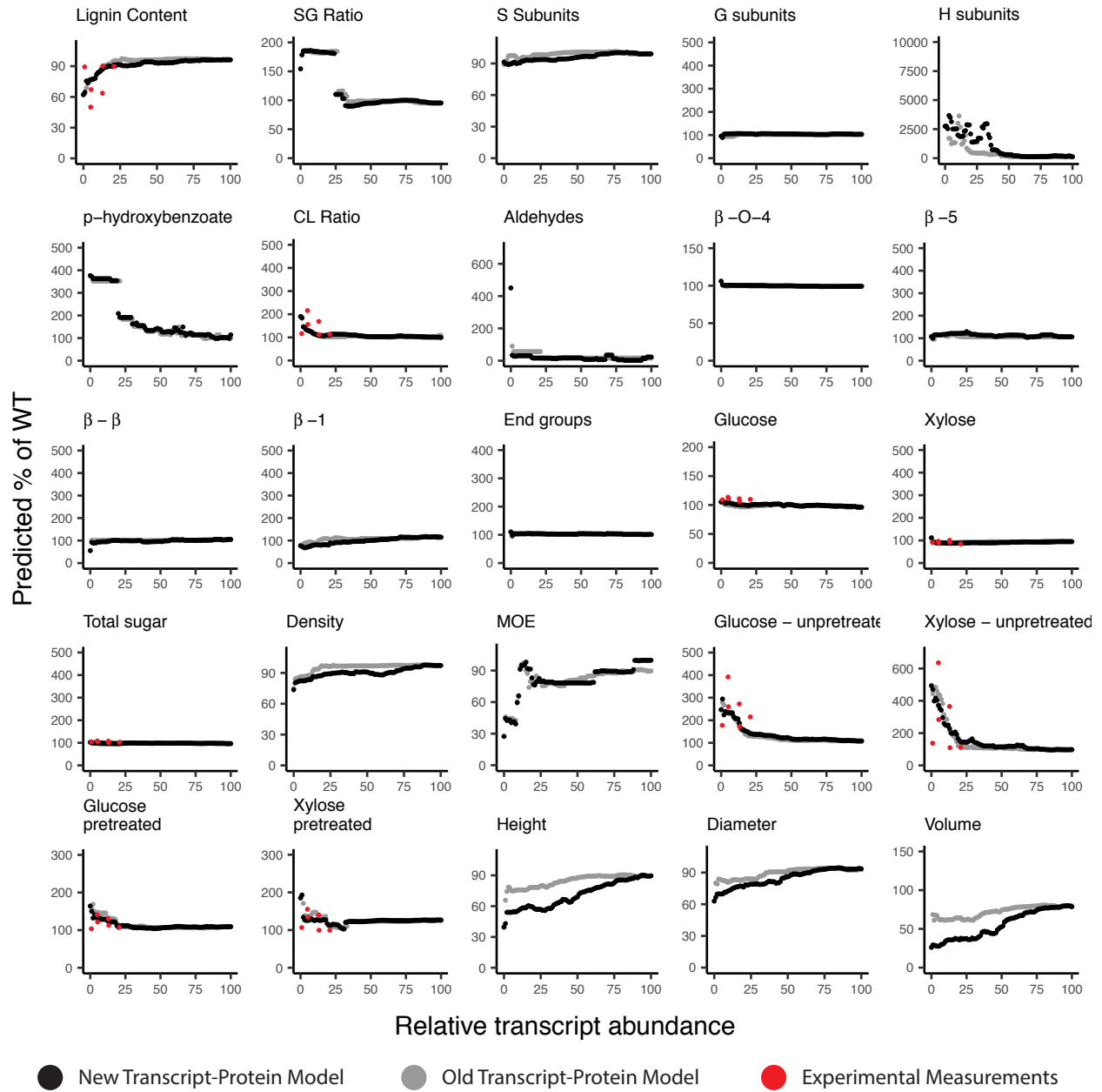


Figure S8: Simulating knockdowns of the *Ptr4CL* family.



*Ptr4CL3* Knockdown

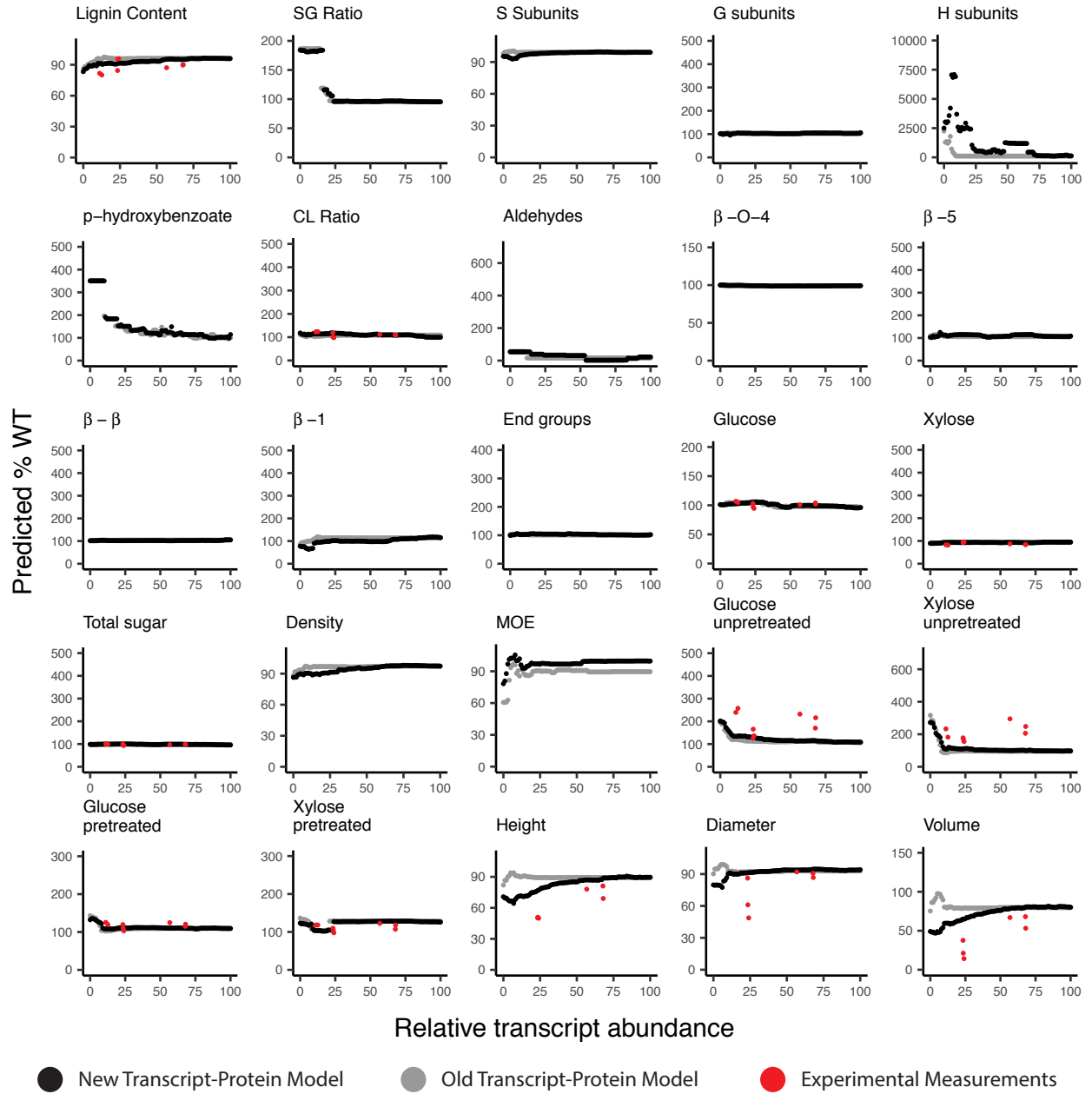


Figure S9: Simulating knockdowns of *Ptr4CL3*.

### Ptr4CL5 Knockdown

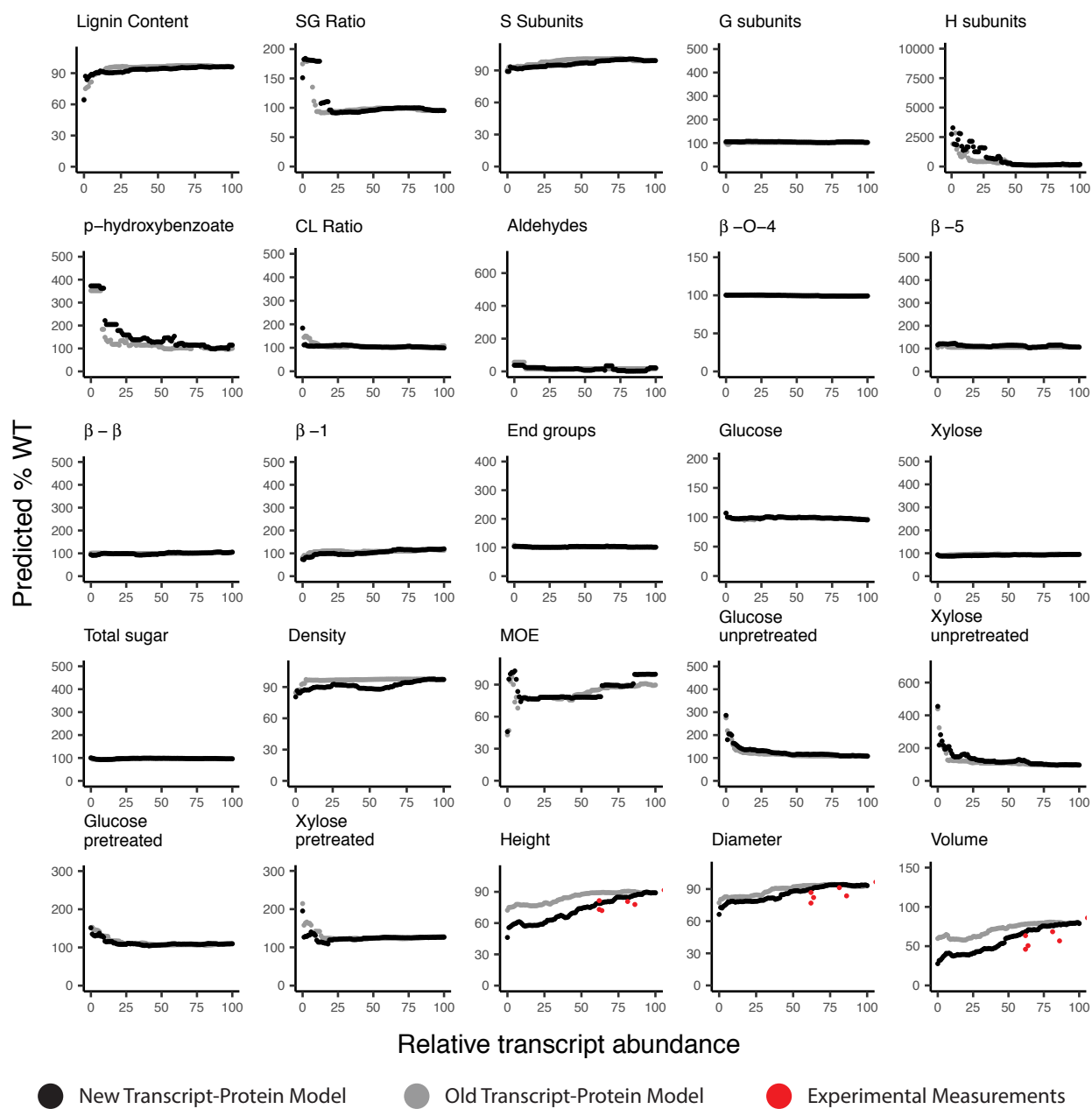


Figure S10: Simulating knockdowns of *Ptr4CL5*.

*PtrC3H3* Knockdown

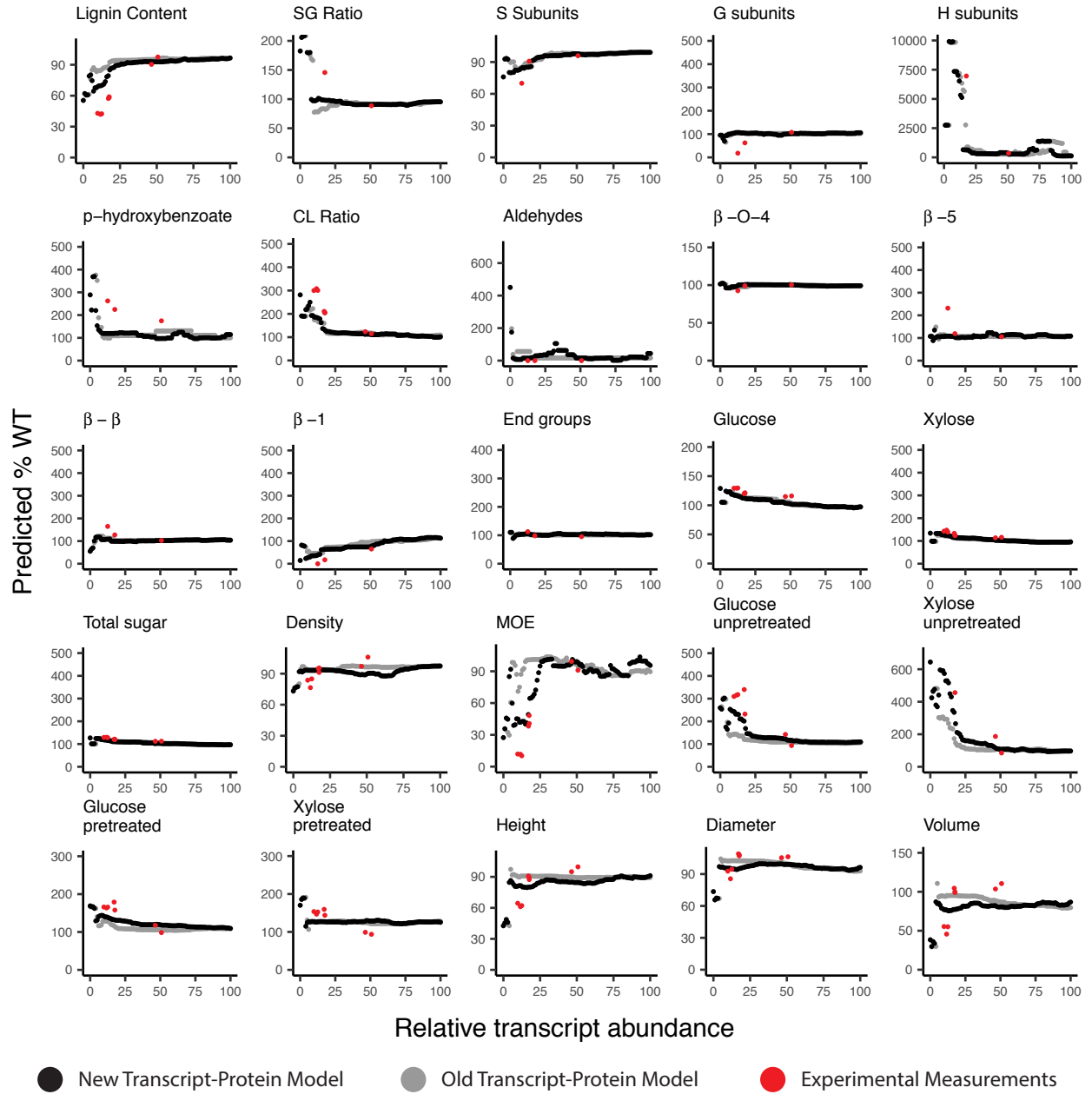


Figure S11: Simulating knockdowns of *PtrC3H3*.

### PtrC3H3 & PtrC4H Family Knockdown

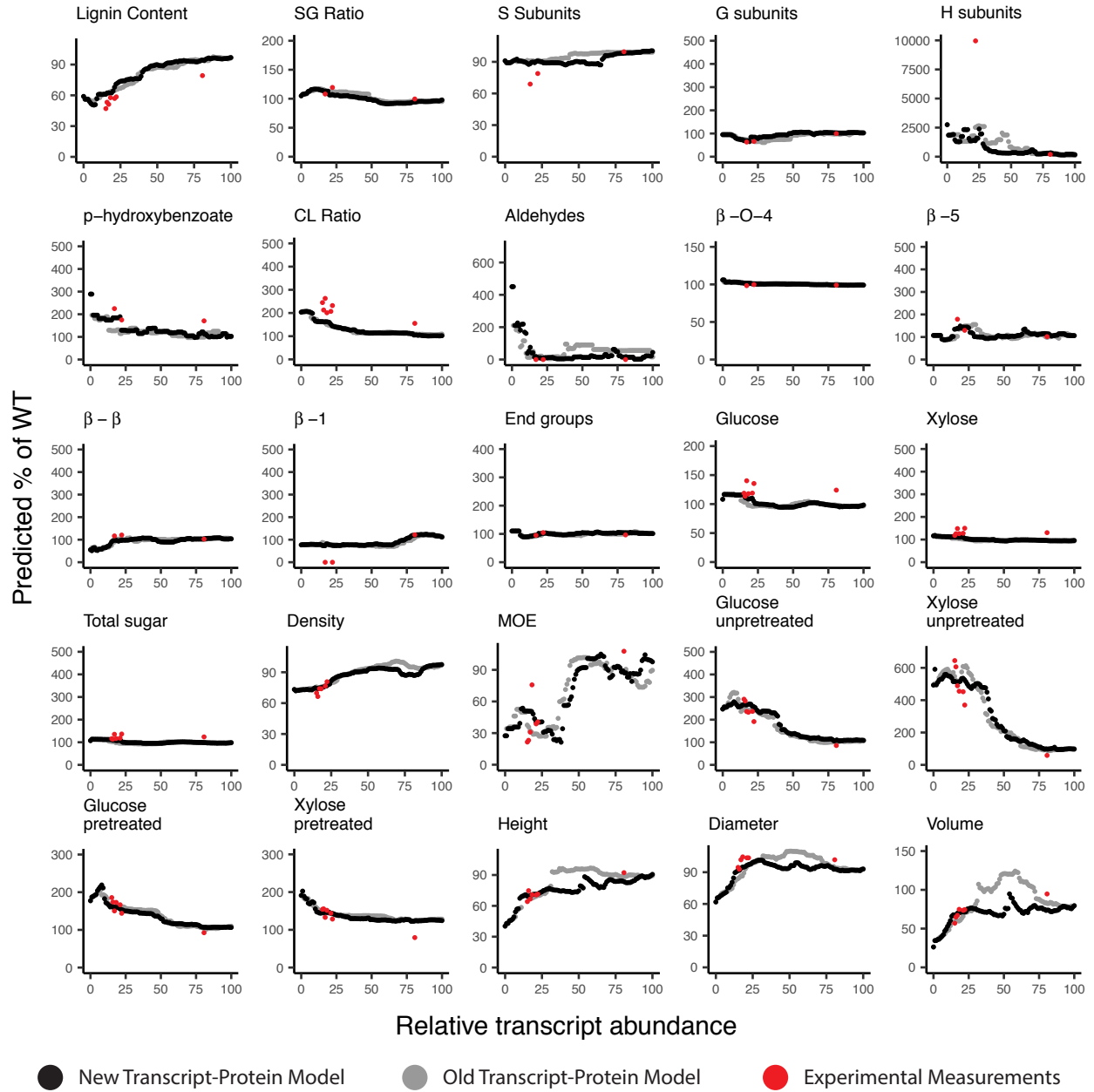


Figure S12: Simulating knockdowns of *PtrC3H3* and the *PtrC4H* family.

### *PtrC4H* Family Knockdown

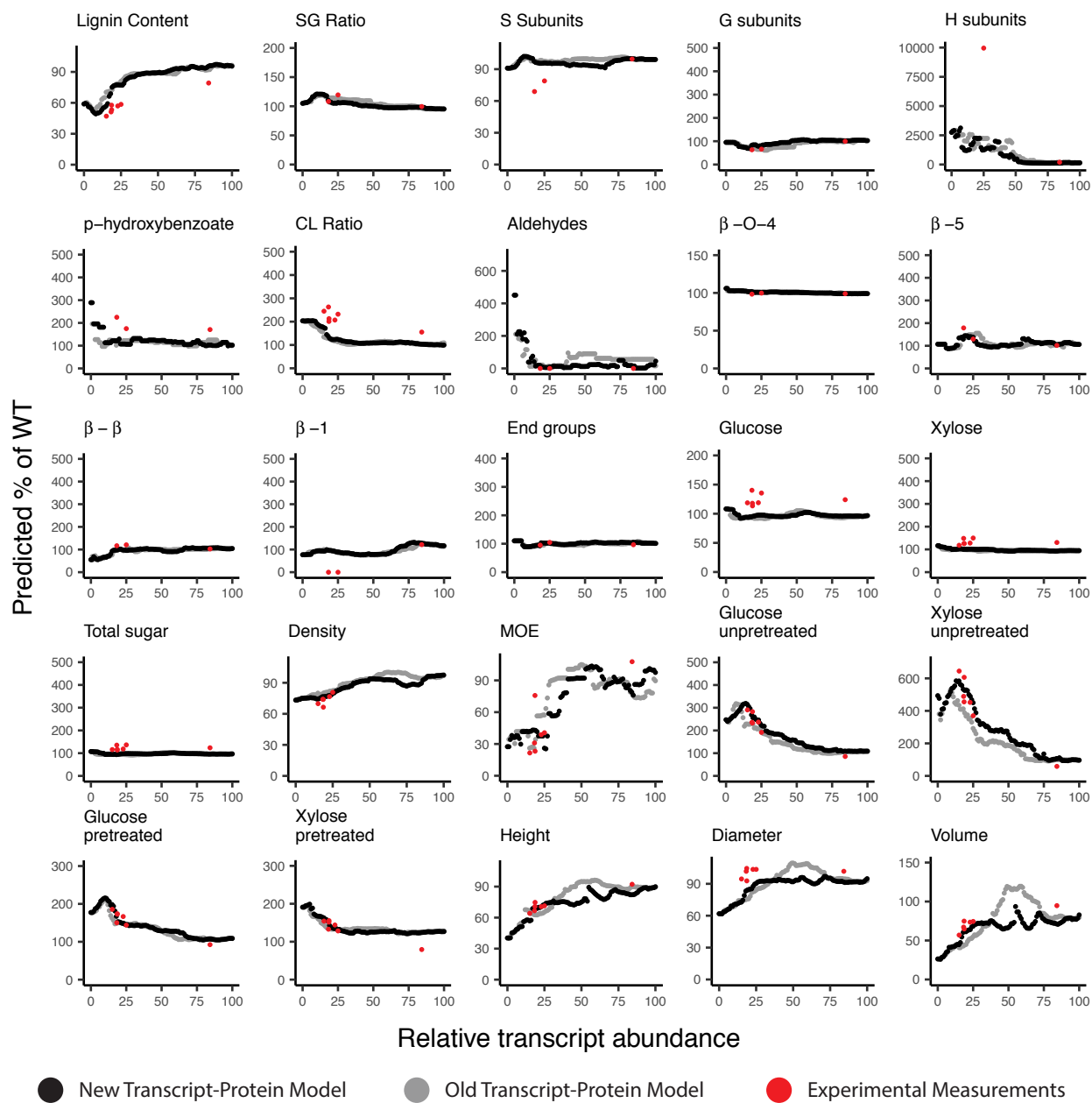


Figure S13: Simulating knockdowns of the *PtrC4H* family.

### *PtrC4H1* Knockdown

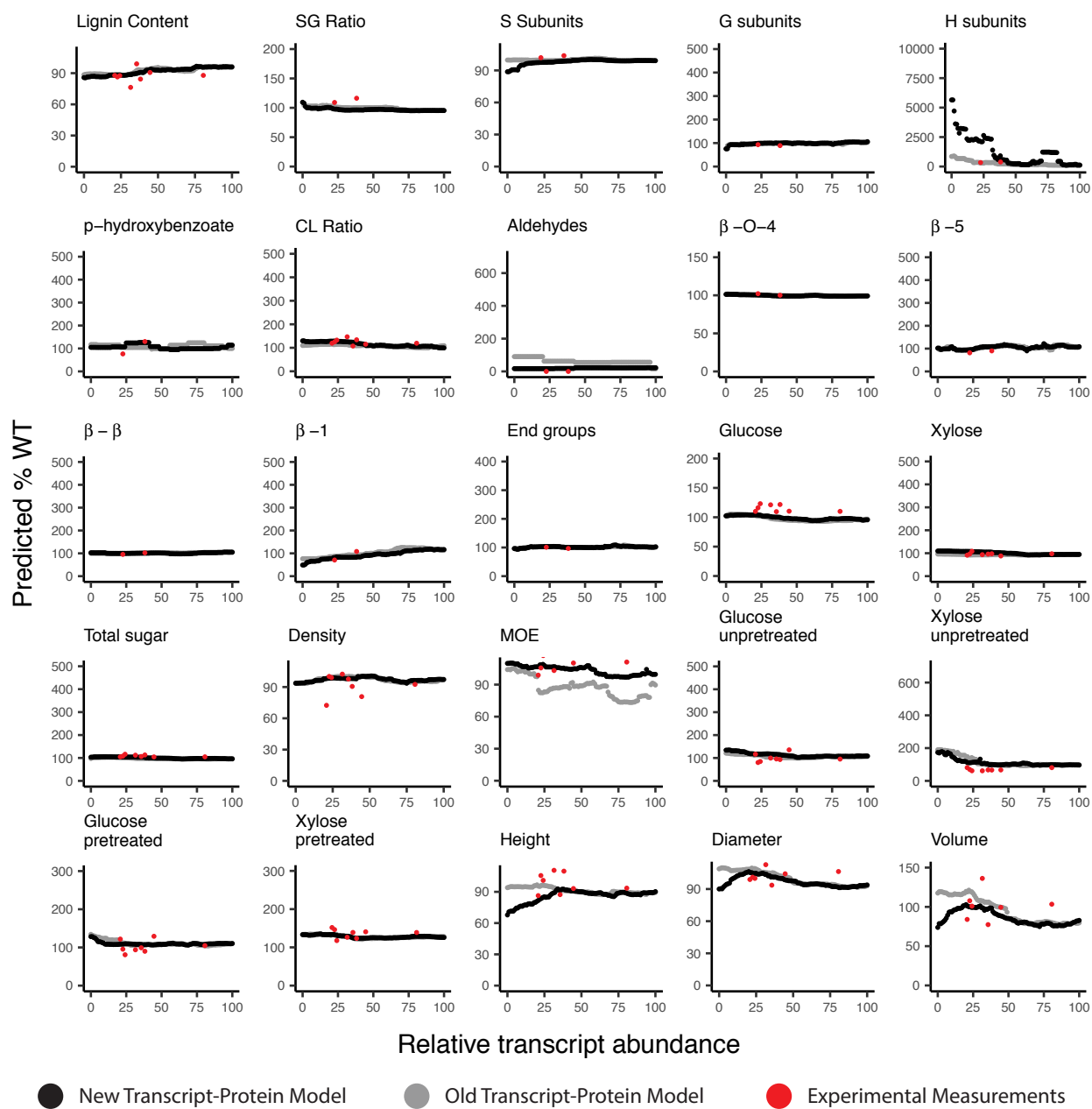


Figure S14: Simulating knockdowns of *PtrC4H1*.

### *PtrC4H2* Knockdown

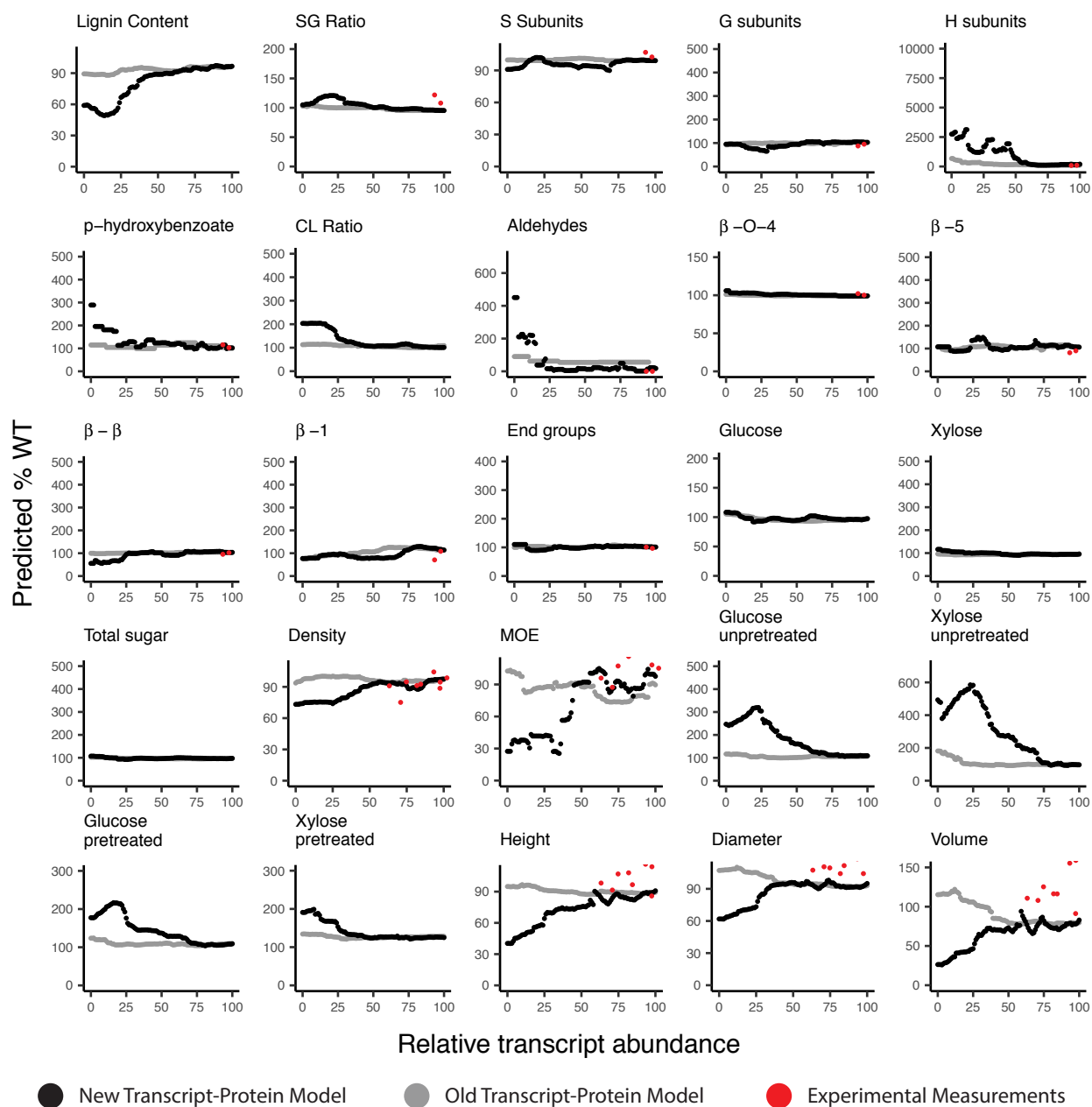


Figure S15: Simulating knockdowns of *PtrC4H2*.

### *PtrCAD* Family Knockdown

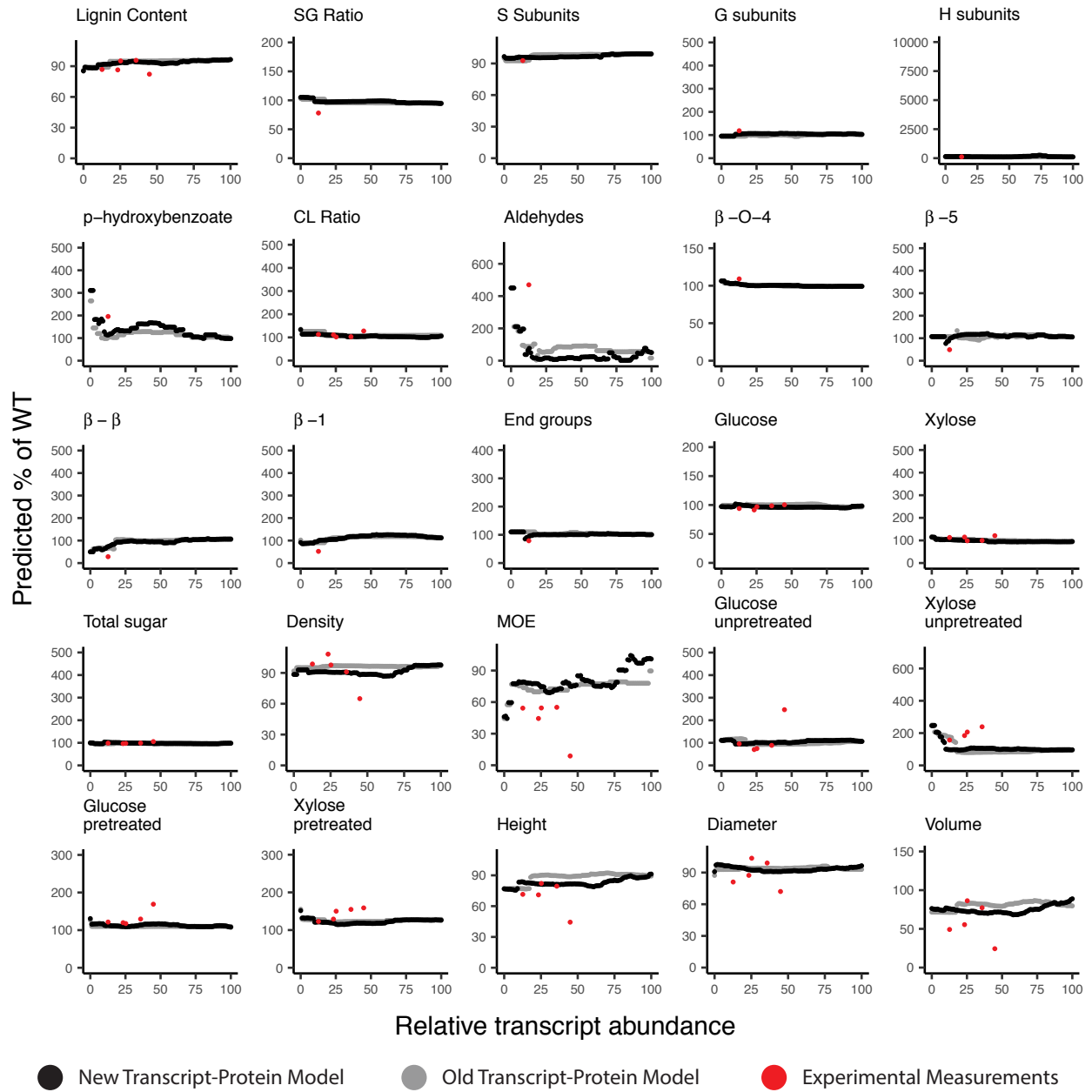


Figure S16: Simulating knockdowns of the *PtrCAD* family.



*PtrCAD1* Knockdown

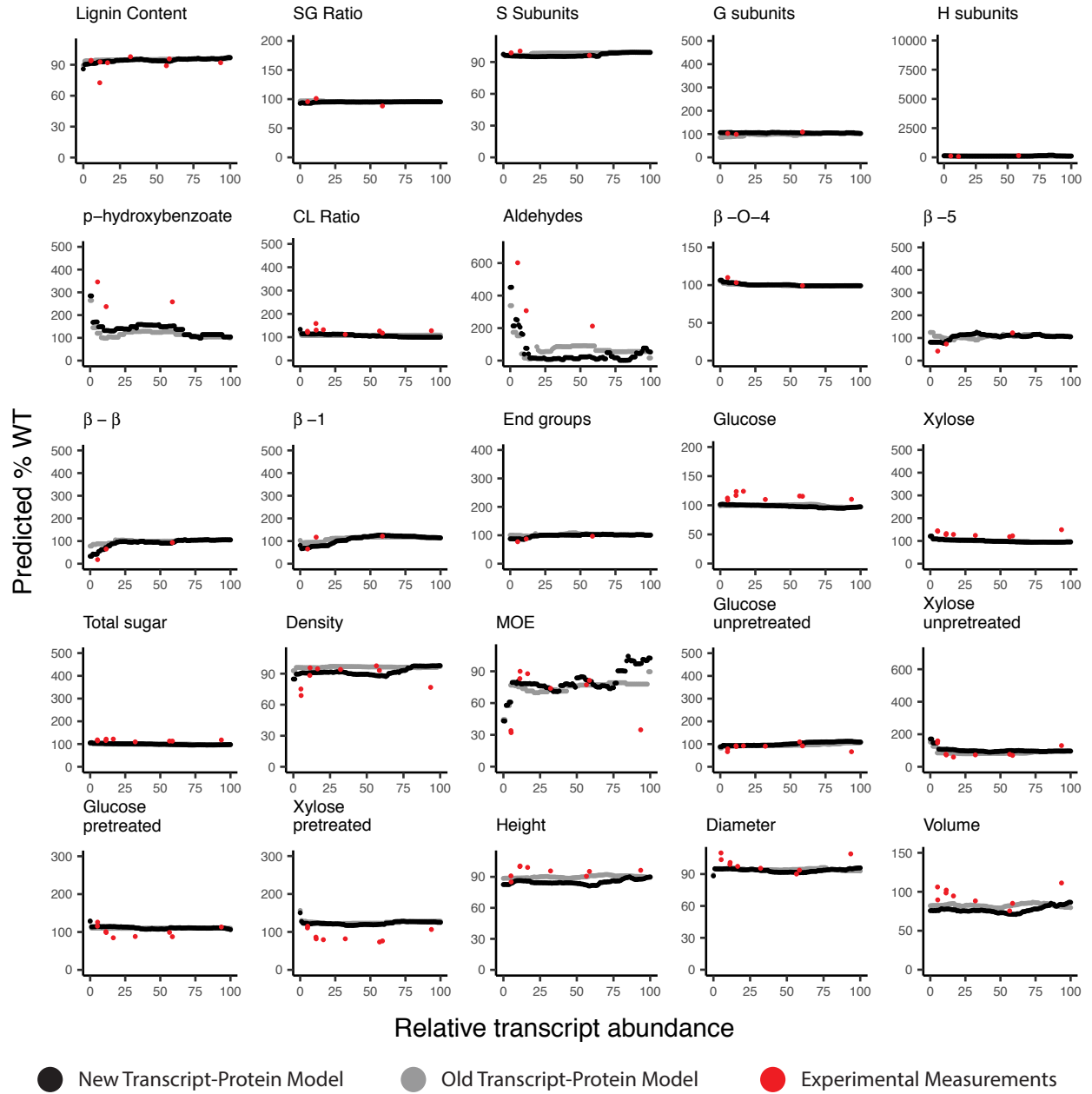


Figure S17: Simulating knockdowns of *PtrCAD1*.

### *PtrCAD2* Knockdown

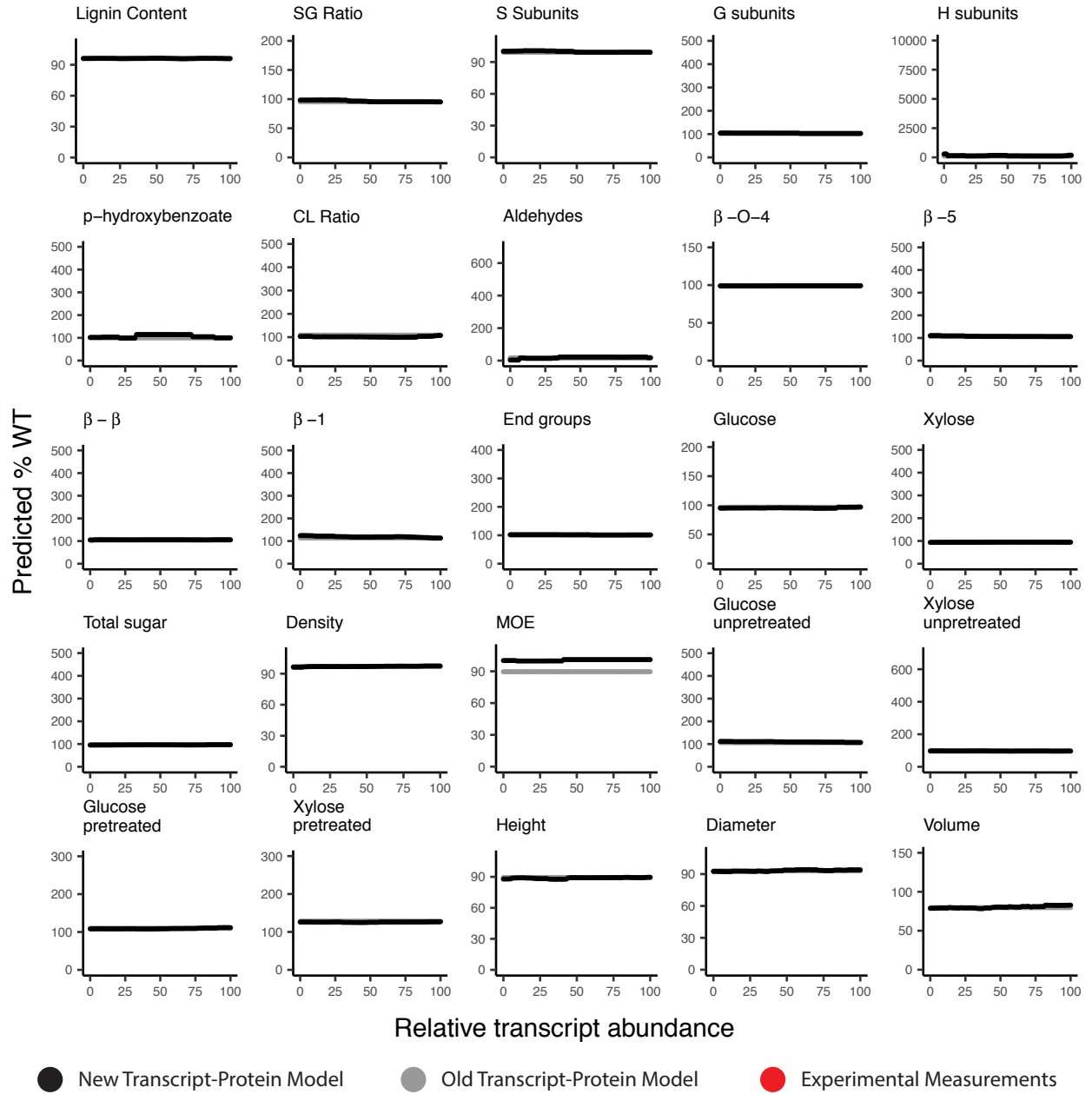


Figure S18: Simulating knockdowns of *PtrCAD2*.

### *PtrCCoAOMT* Family Knockdown

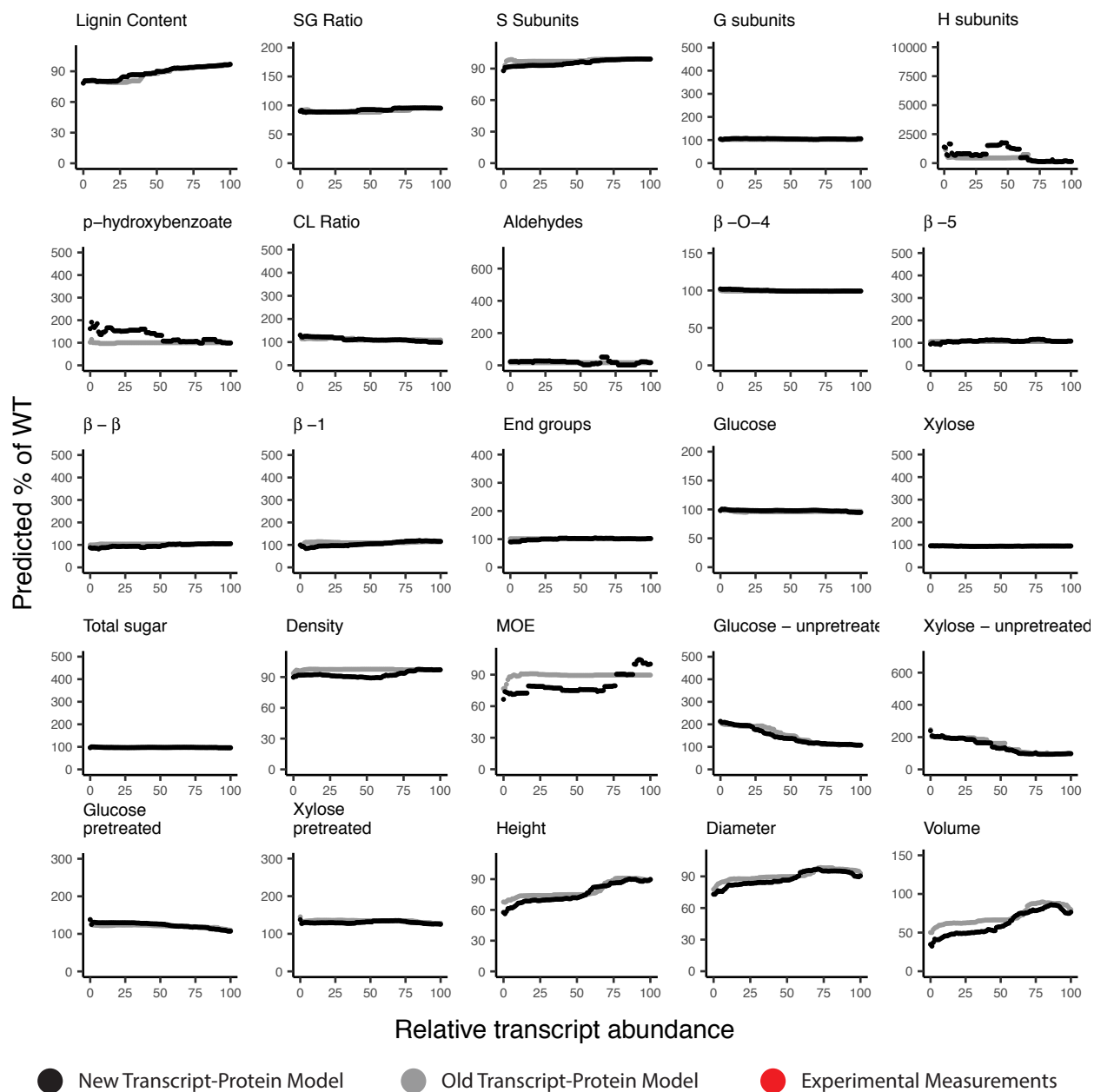


Figure S19: Simulating knockdowns of the *PtrCCoAOMT* family.

### *PtrCCoAOMT1* Knockdown

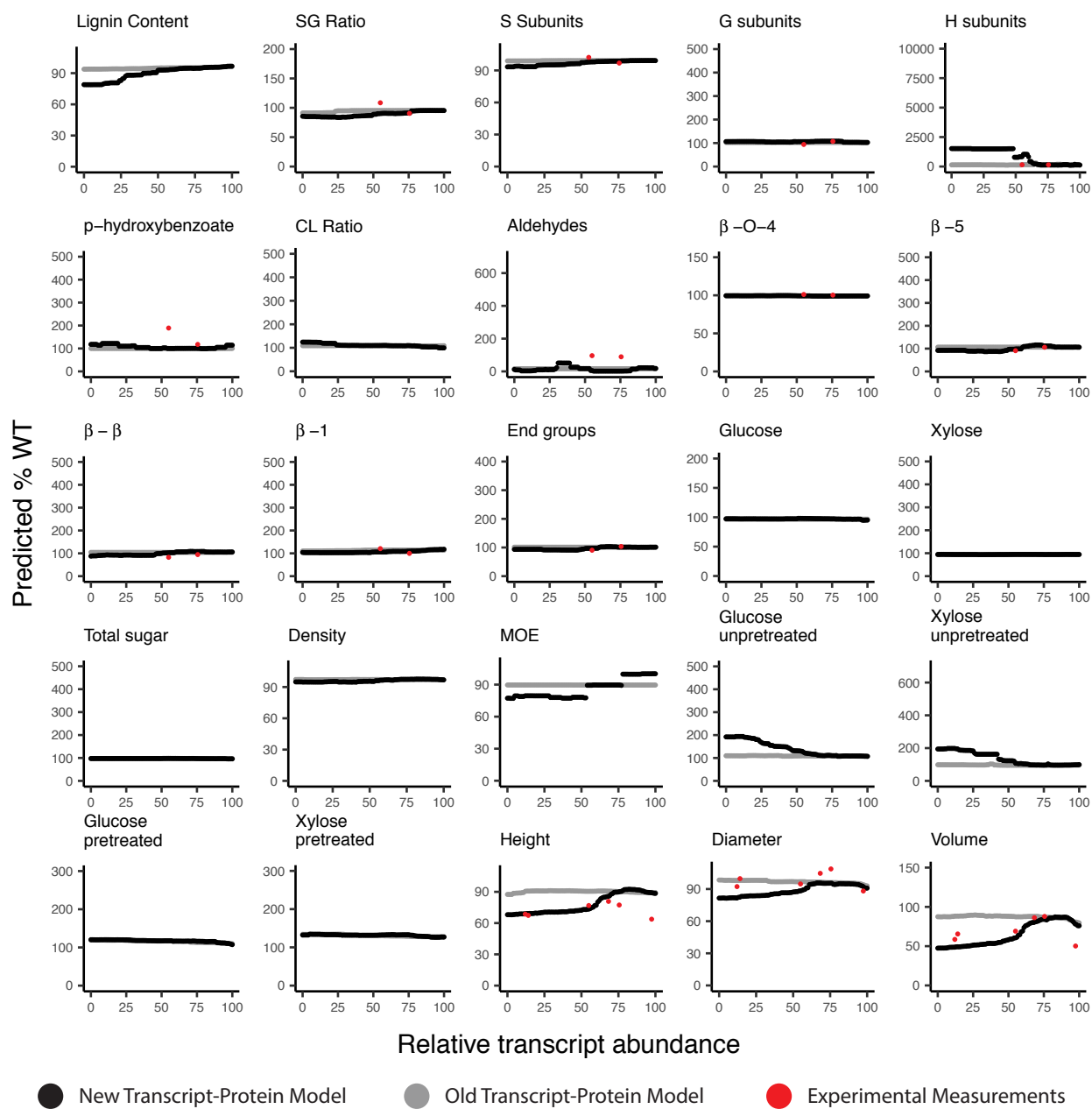


Figure S20: Simulating knockdowns of *PtrCCoAOMT1*.

*PtrCCoAOMT2* Knockdown

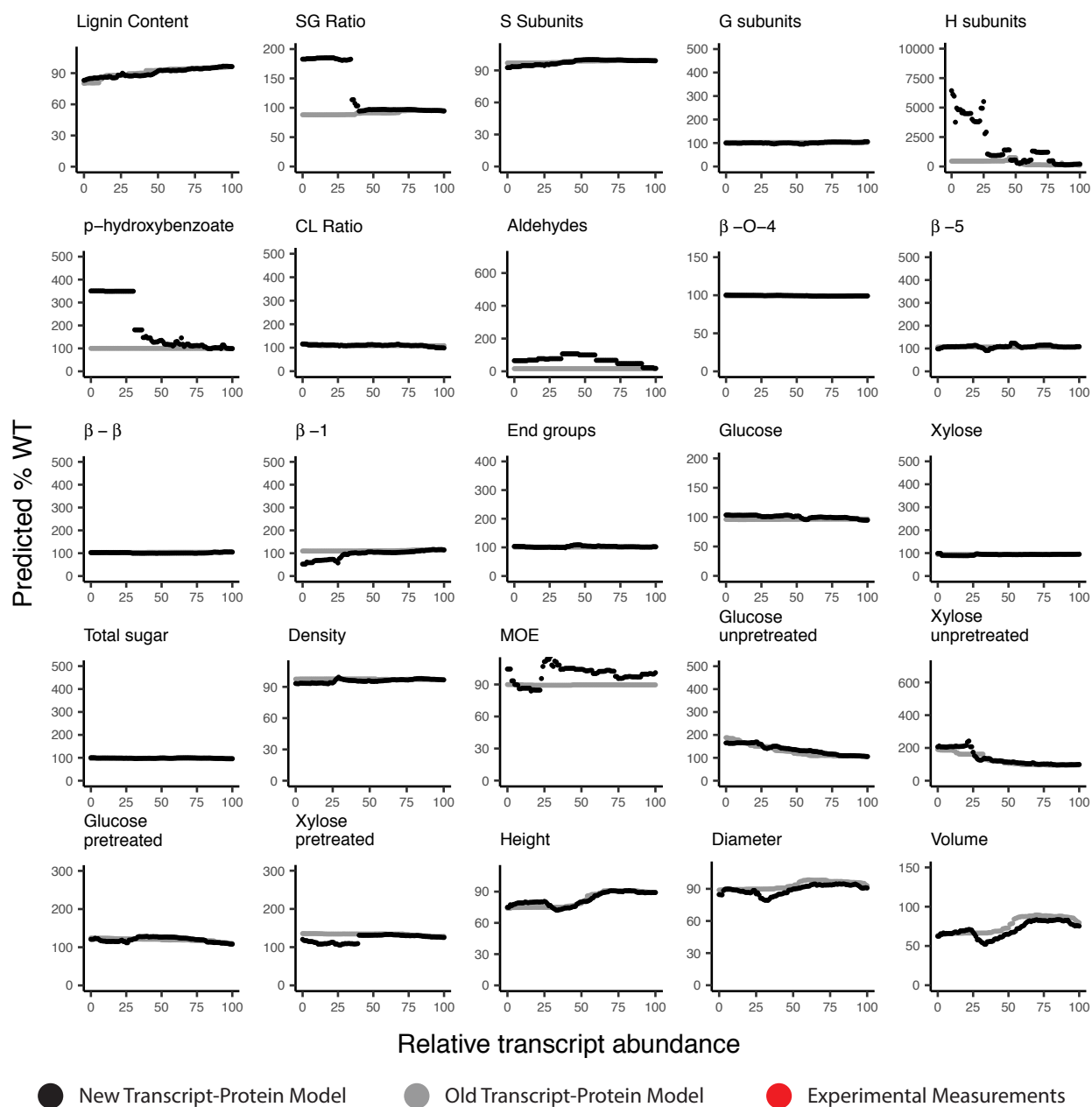


Figure S21: Simulating knockdowns of *PtrCCoAOMT2* monolignol gene.

### *PtrCCoAOMT3* Knockdown

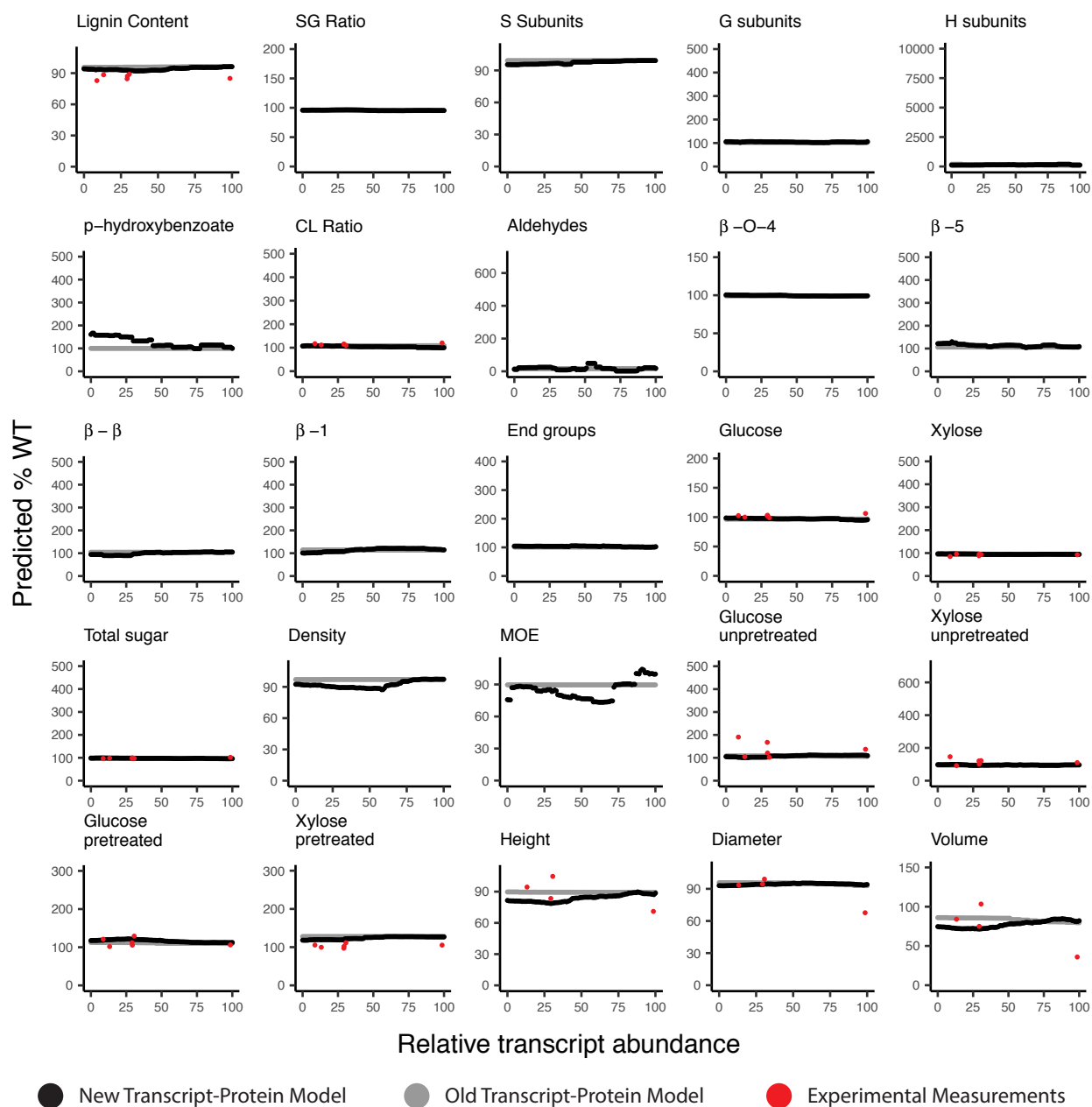


Figure S22: Simulating knockdowns of *PtrCCoAOMT3*.

### *PtrCAld5H* Family Knockdown

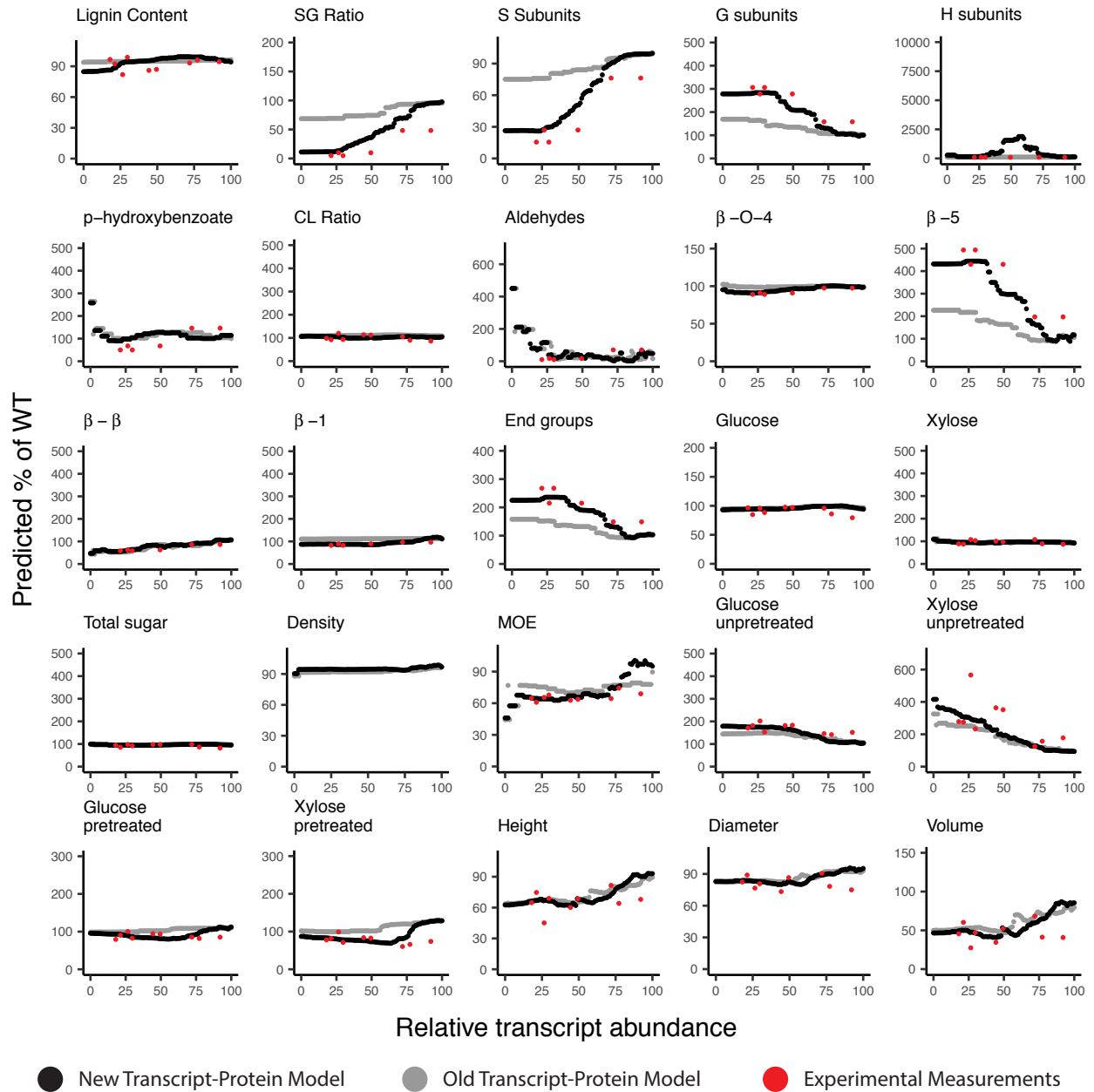


Figure S23: Simulating knockdowns of the *PtrCAld5H* family.

### *PtrCald5H1* Knockdown

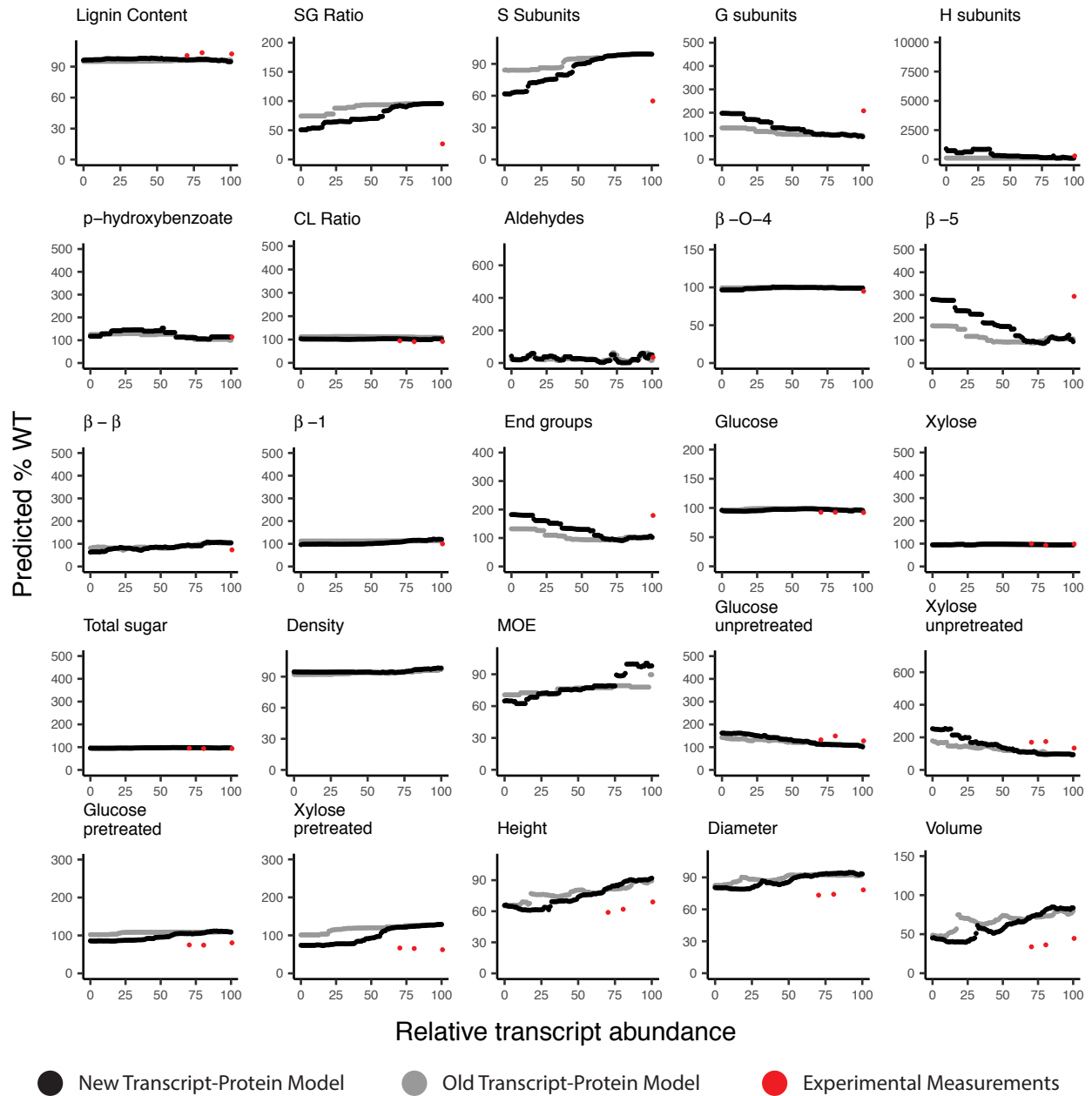


Figure S24: Simulating knockdowns of *PtrCald5H1*.



*PtrCald5H2* Knockdown

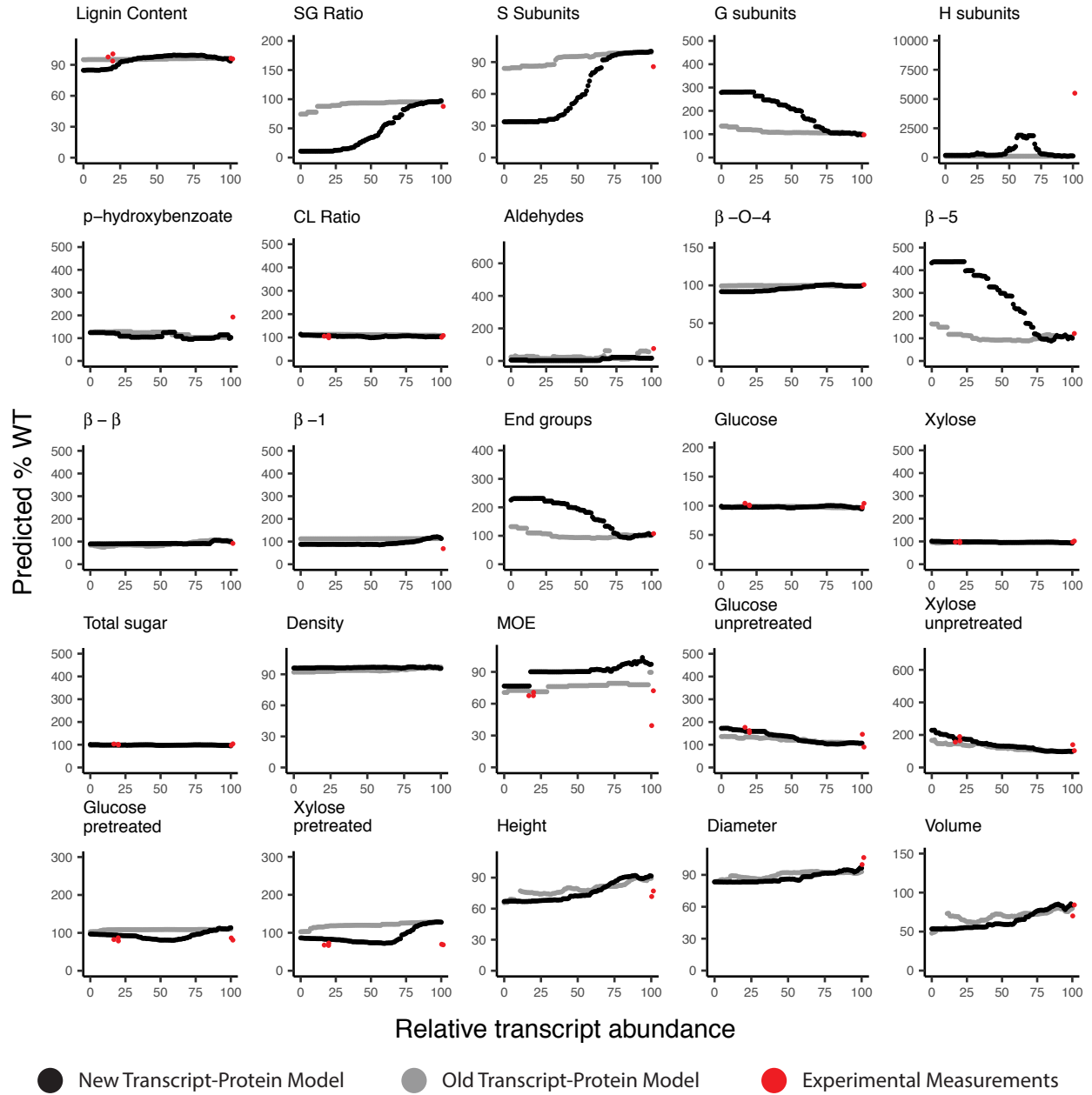


Figure S25: Simulating knockdowns of *PtrCald5H2*.

### *PtrHCT* Family Knockdown

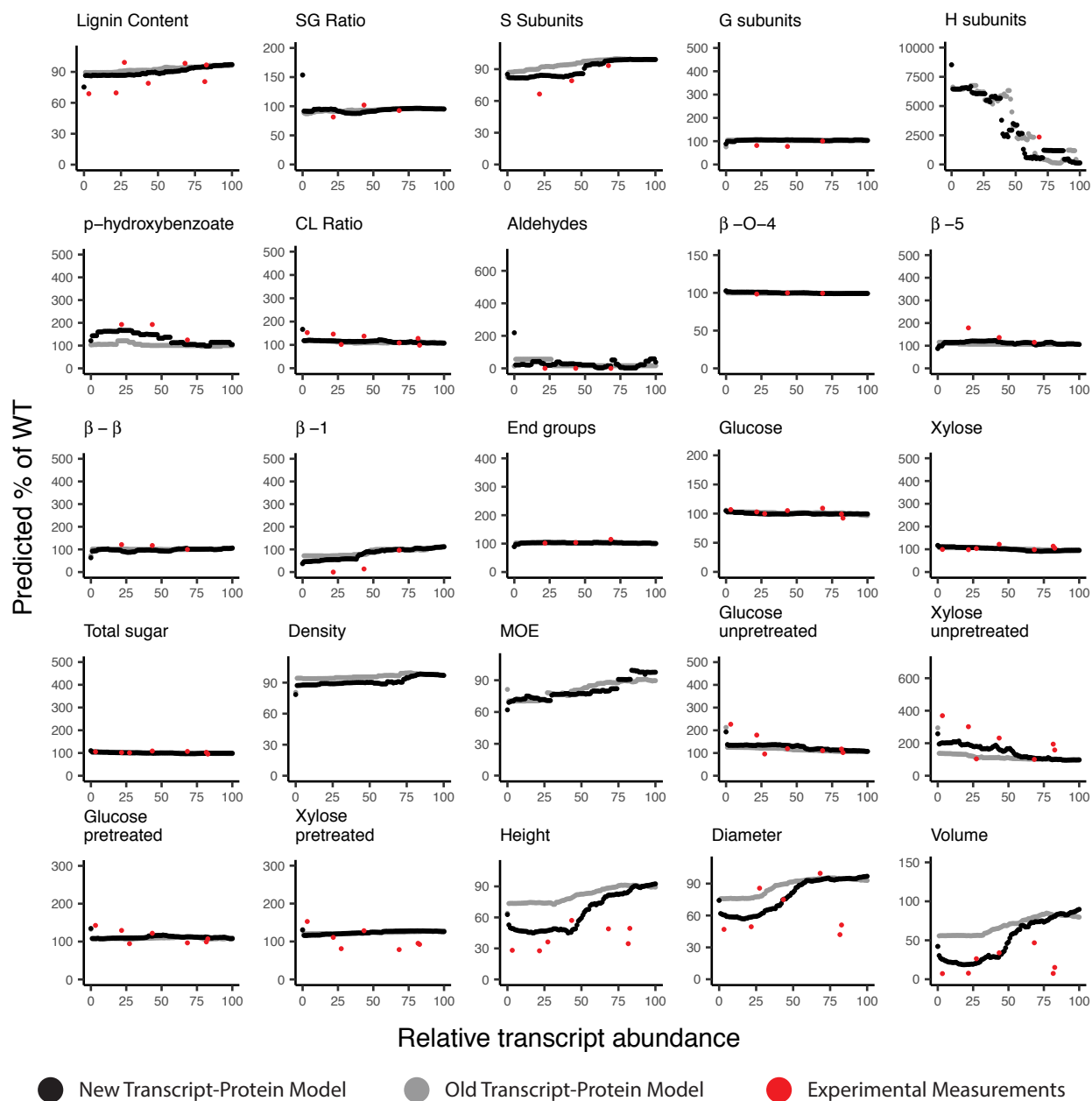


Figure S26: Simulating knockdowns of the *PtrHCT* family.

### *PtrHCT1* Knockdown

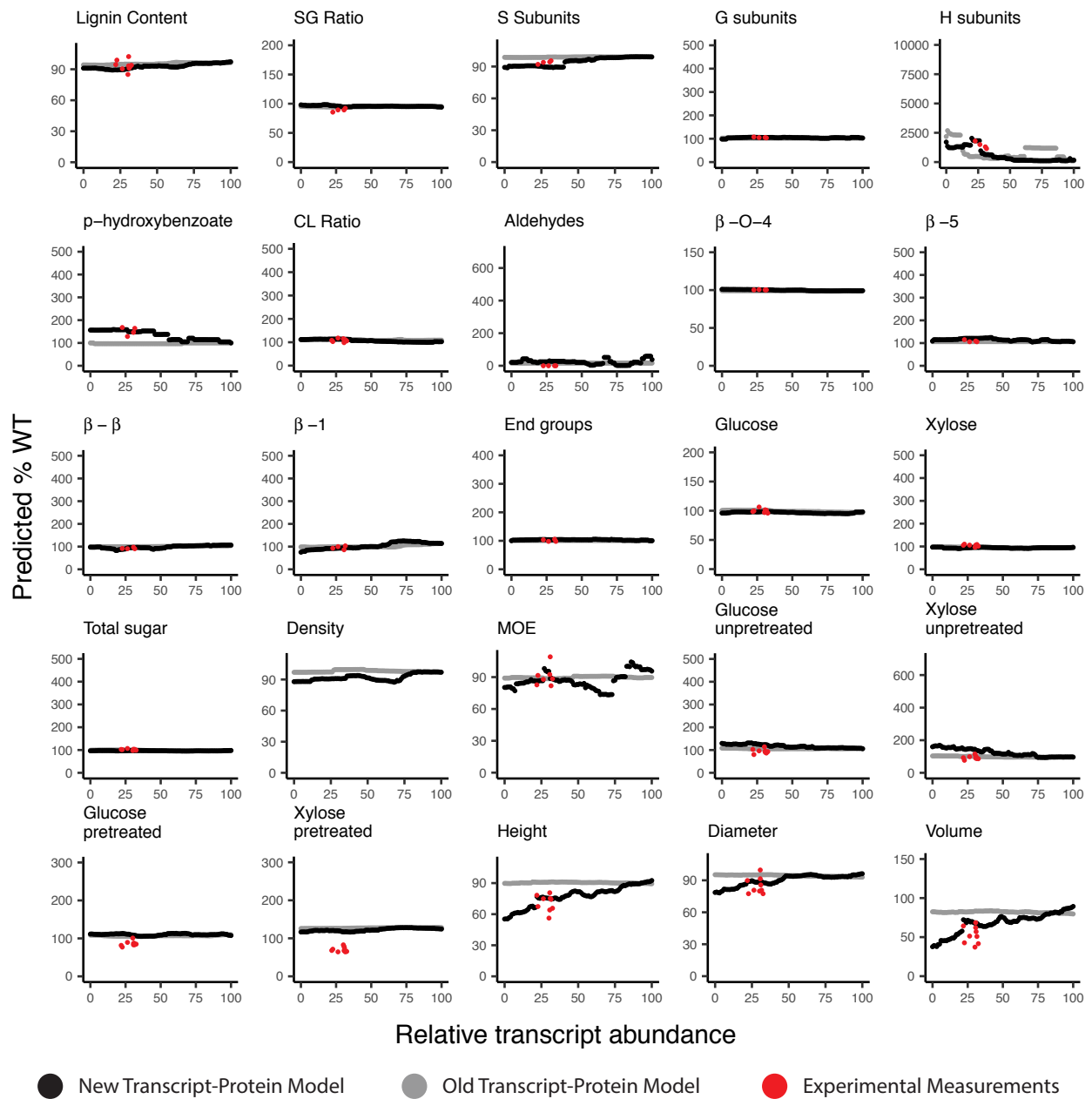


Figure S27: Simulating knockdowns of *PtrHCT1*.

*PtrHCT6* Knockdown

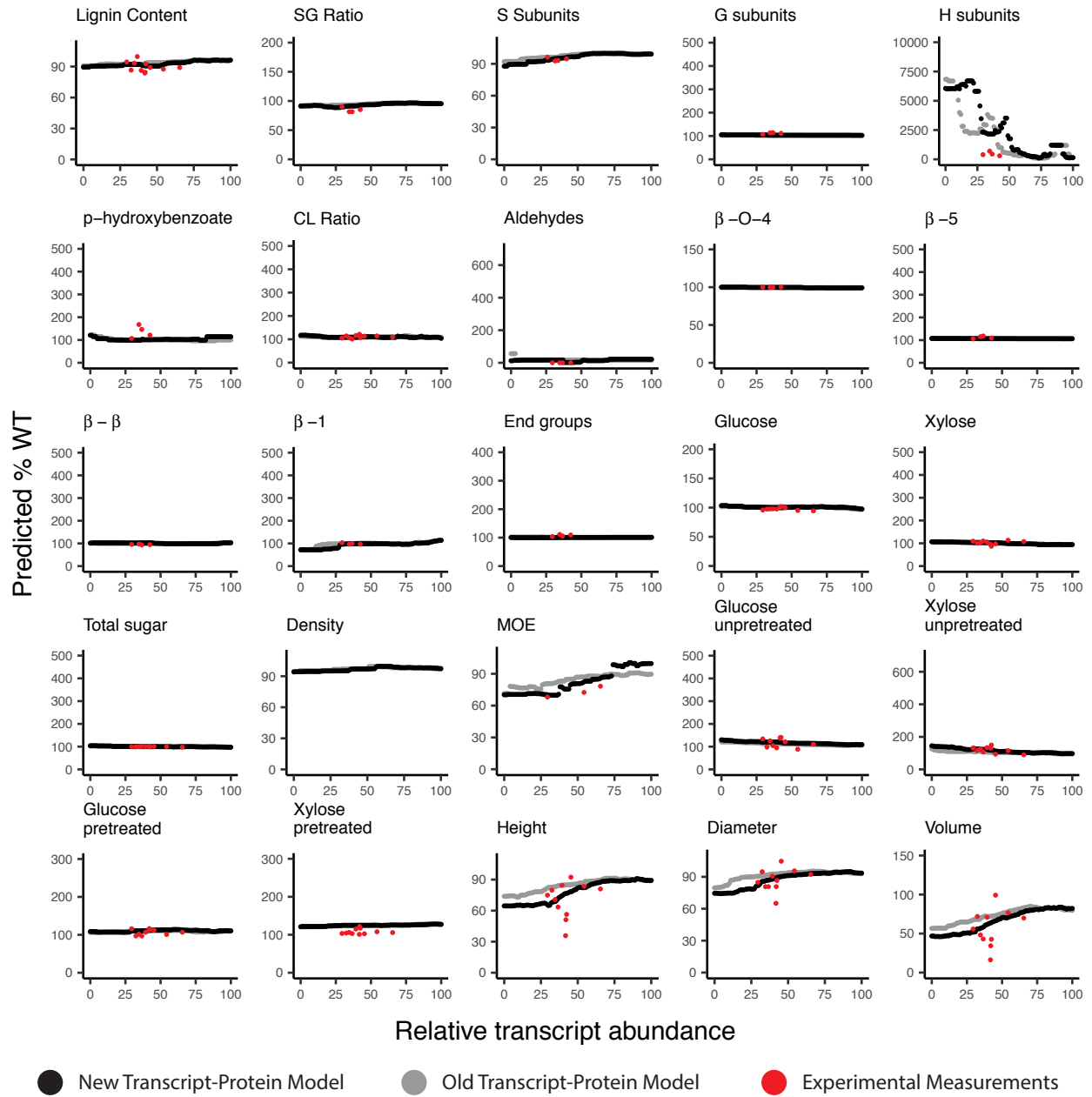


Figure S28: Simulating knockdowns of *PtrHCT6*.

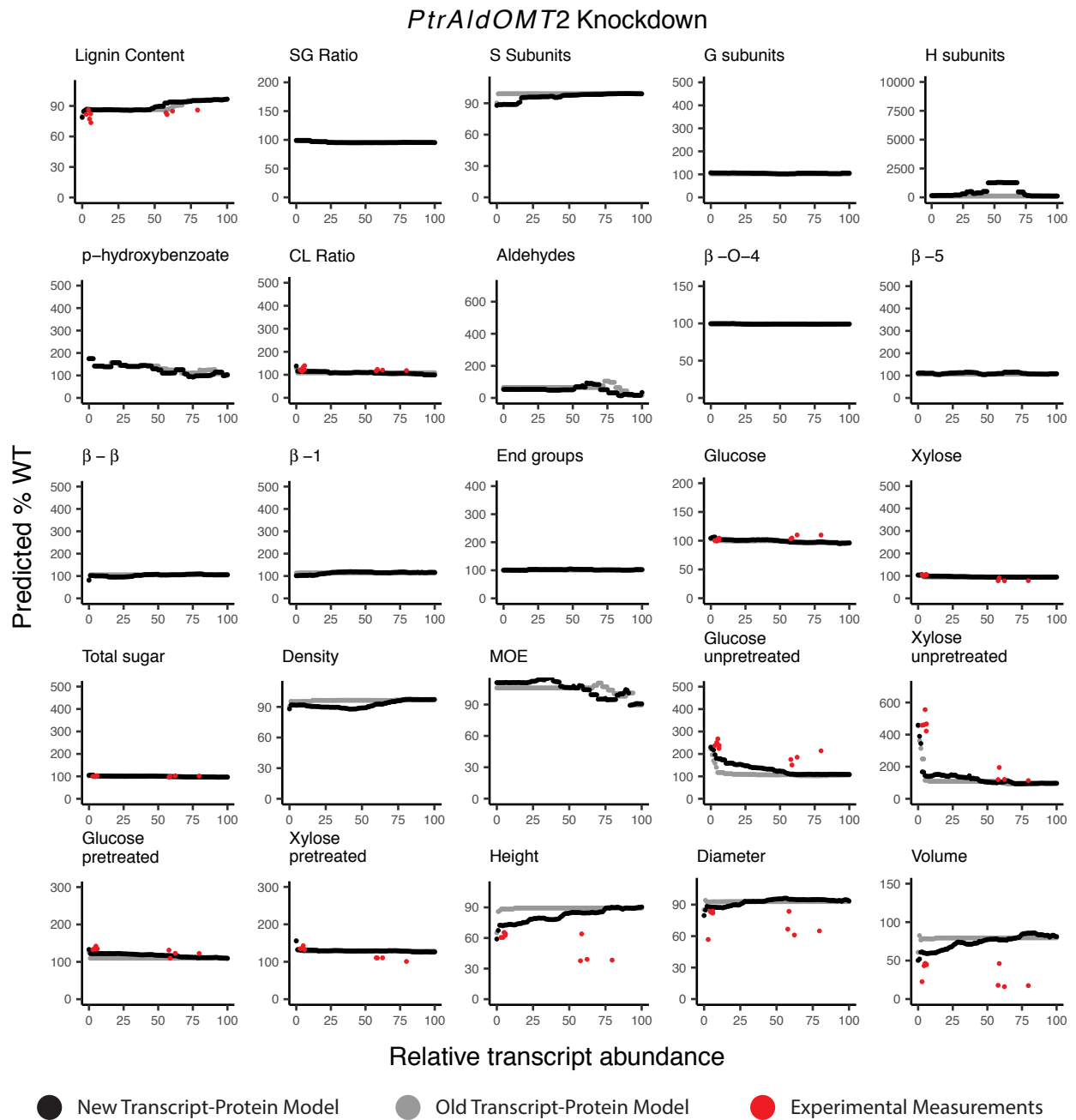


Figure S29: Simulating knockdowns of *PtrAldOMT2*.

*PtrCCR2* Knockdown

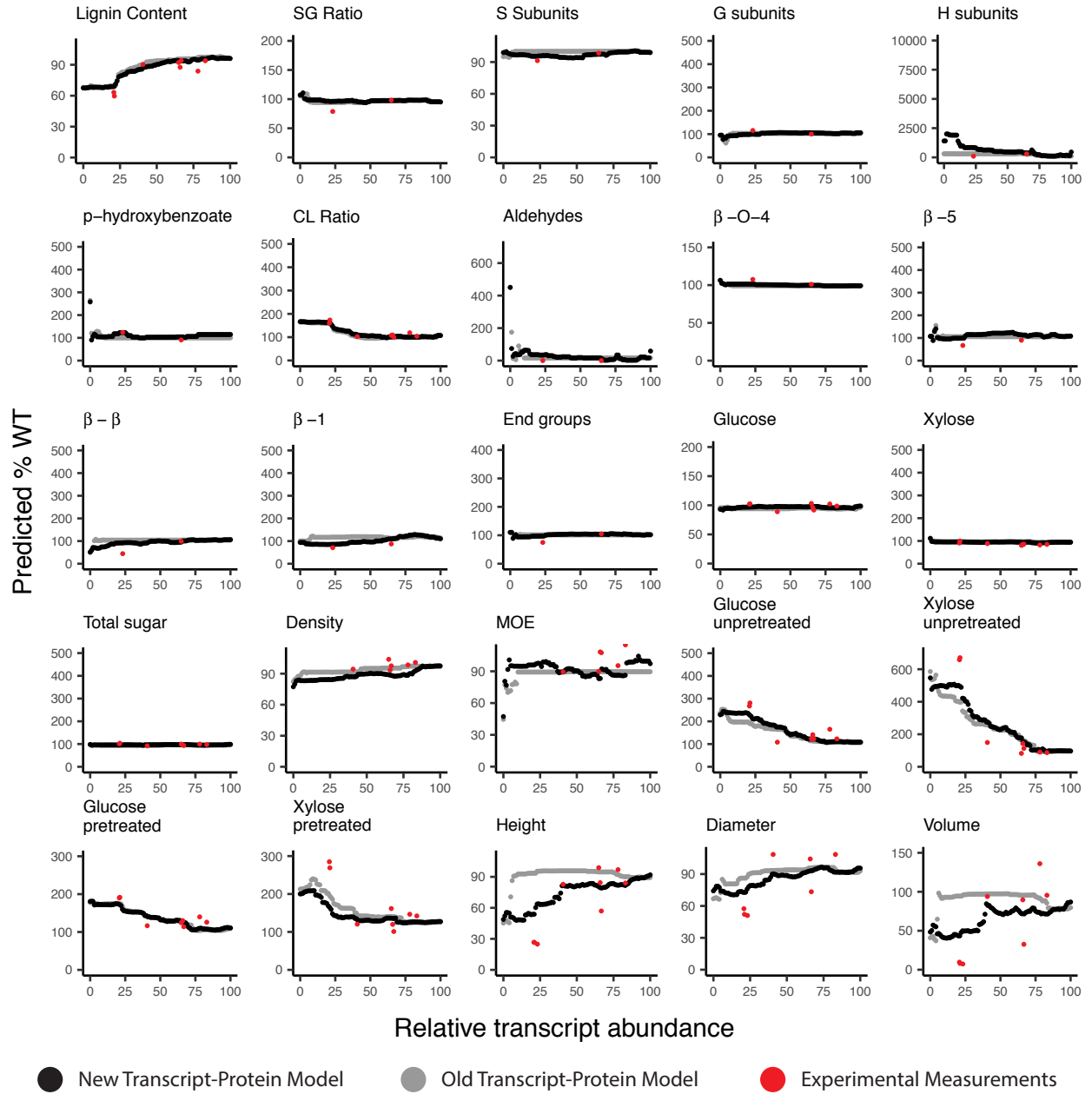


Figure S30: Simulating knockdowns of *PtrCCR2*.

## *PtrAldOMT2* and *PtrCAD* Knockdowns

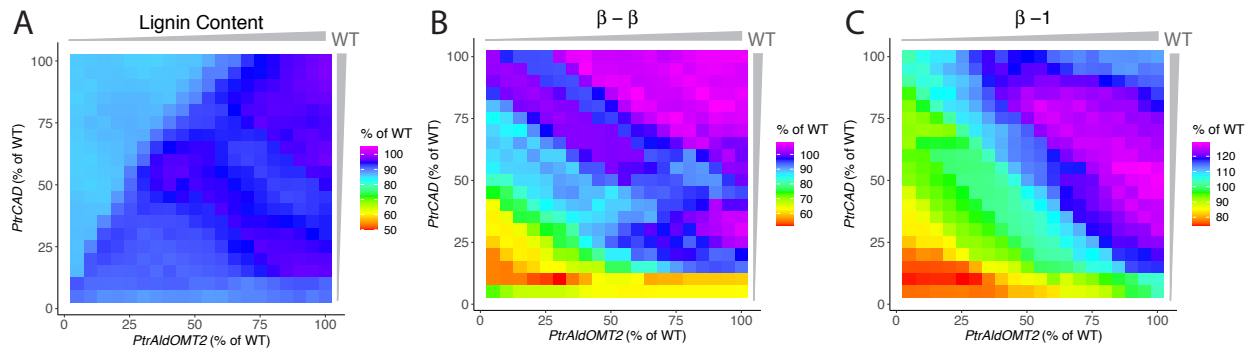


Figure S31: Combinatorial knockdown simulations of *PtrAldOMT2* and *PtrCAD*.

## *PtrAldOMT2* and *PtrCCoAOMT* Knockdowns

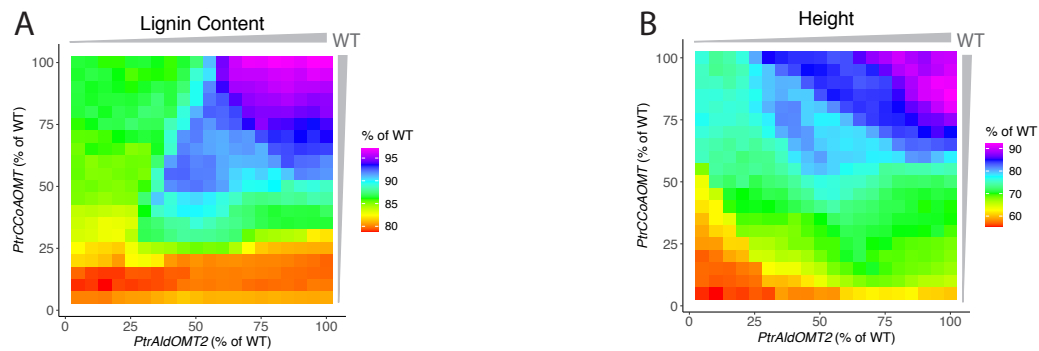


Figure S32: Combinatorial knockdown simulations of *PtrAldOMT2* and *PtrCCoAOMT*.